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(54) **Imidazoheterocyclic compounds processes for preparation thereof and pharmaceutical compositions comprising them.**

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Description

The present invention relates to novel imidazoheterocyclic compounds and pharmaceutically acceptable salt thereof. More particularly, it relates to novel imidazoheterocyclic compounds and pharmaceutically acceptable salts thereof which have antiulcerative activity, to processes for preparation thereof, to a pharmaceutical composition comprising the same.

EP-A-0 033 094 discloses imidazo[1,2-a]pyridines and 2,3-dihydro-, 5,6,7,8-tetrahydro-, 2,3,5,6,7,8-hexahydro-analogues and salts of such compounds. Also the process for preparing the compounds and pharmaceutical compositions containing them are disclosed. It is described that the compounds are antisecretory and cytoprotective agents and are particularly useful in the treatment of ulcer diseases.

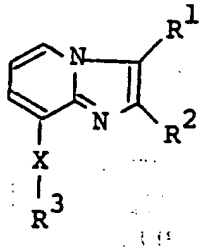
Accordingly, one object of the present invention is to provide novel imidazoheterocyclic compounds and pharmaceutically acceptable salt thereof, which are useful as an antiulcerative agent.

Another object of the present invention is to provide processes for preparation of said imidazoheterocyclic compounds and salts thereof.

A further object of the present invention is to provide a pharmaceutical composition comprising, as an active ingredient, said imidazoheterocyclic compound or its pharmaceutically acceptable salt.

Still further object of the present invention is to provide a method of using said imidazoheterocyclic compound or its pharmaceutically acceptable salt in the treatment of ulcer in human or animals.

The imidazoheterocyclic compounds of the present invention are novel and can be represented by the formula (I):



(I)

wherein

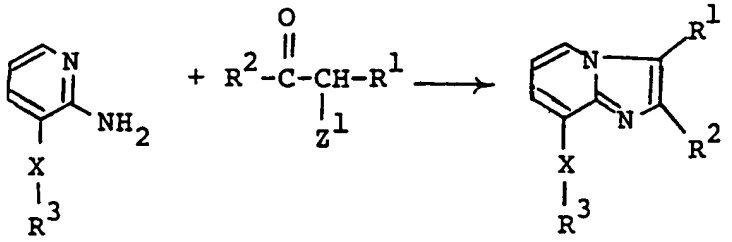
R^1 is (C_2 - C_6) alkenyl, (C_2 - C_6) alkynyl,
(C_3 - C_6) alkadienyl,
(C_2 - C_6) alkenyloxy (C_1 - C_6) alkyl,
(C_2 - C_6) alkynyloxy (C_1 - C_6) alkyl,
carboxy (C_2 - C_6) alkynyloxy (C_1 - C_6) alkyl or
(C_1 - C_6) alkoxycarbonyl (C_2 - C_6) alkynyloxy (C_1 - C_6) alkyl;

R^2 is hydrogen, (C_1 - C_6) alkyl or aryl selected from a group consisting of phenyl, tolyl, xylyl, 1-naphthyl, 2-naphthyl, 1-anthryl, and 2-anthryl,

R^3 is ar (C_1 - C_6) alkyl which has one or more suitable substituent(s) selected from a group consisting of (C_1 - C_6)-alkyl and halogen,
ar (C_2 - C_6) alkenyl, benzene-condensed cyclo (C_5 - C_6) alkyl, (C_1 - C_6) alkyl having cyclo (C_3 - C_6) alkyl or
(C_1 - C_6) alkyl, and

X is O or NH.

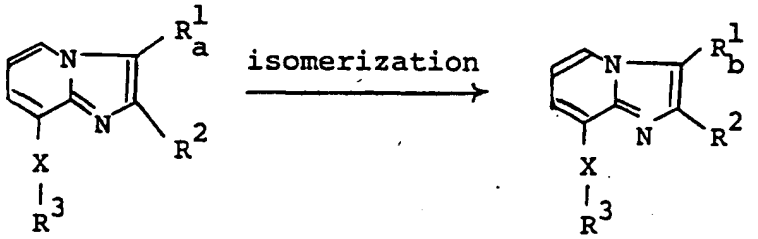
According to the present invention, the object compounds (I) can be prepared by the following processes.



(II) (III) (I)

or a salt thereof or a salt thereof or a salt thereof

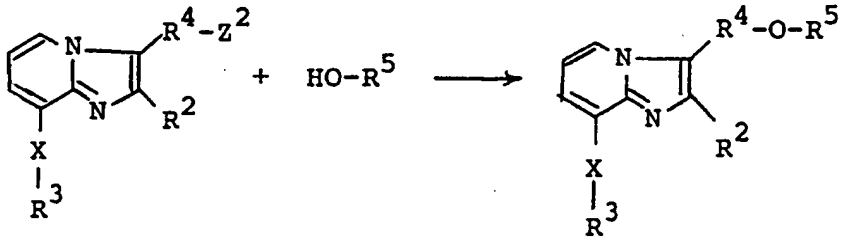
Process 2



(Ia) (Ib)

or a salt thereof or a salt thereof

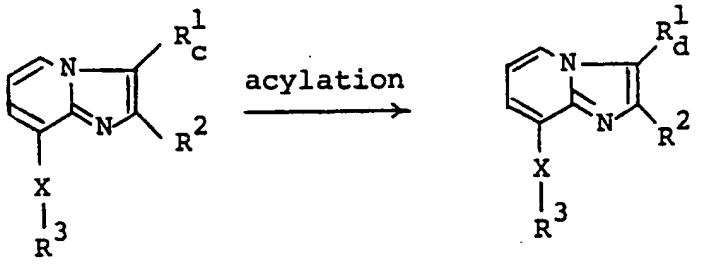
Process 3



(IV) (V) (Ic)

or a salt thereof or a salt thereof or a salt thereof

Process 4



(Id) or a salt thereof

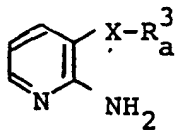
(Ie) or a salt thereof

wherein

R^1, R^2, R^3, X and Y	are each as defined above,
R^1_a is	(C_2 - C_6) alkynyl,
R^1_b is	cumulated (C_3 - C_6) alkadienyl,
R^1_c is	(ω-(C_2 - C_6) alkynyloxy) (C_1 - C_6) alkyl,
R^1_d is	(ω-carboxy-ω-(C_2 - C_6) alkynyloxy) (C_1 - C_6) alkyl or (ω-(C_1 - C_6) alkoxycarbonyl-ω-(C_2 - C_6) alkynyloxy)-(C_1 - C_6) alkyl,
R^4 is	(C_1 - C_6) alkylene,
R^5 is	(C_2 - C_6) alkenyl, (C_2 - C_6) alkynyl, carboxy (C_2 - C_6) alkynyl or (C_1 - C_6) alkoxycarbonyl (C_2 - C_6) alkynyl,
Z^1 is	an acid residue selected from a group consisting of halogen and acyloxy, and
Z^2 is	a leaving group.

As to the starting compounds (II), (III) and (IV), some of them are novel and can be prepared by the procedures disclosed in the Preparations as mentioned later.

Especially, some of said novel starting compound (II) can be represented by the following general formula:



(VI)

wherein

R^3_a is	(C_1 - C_6) alkyl having cyclo (C_3 - C_6) alkyl or ar (C_1 - C_6) alkyl which has one or more suitable substituent(s) selected from the group consisting of (C_1 - C_6) alkyl and halogen,
X is	O or NH.

Suitable pharmaceutically acceptable salts of the object compounds (I) are conventional non-toxic salts and include a salt with a base or an acid addition salt such as a salt with an inorganic base, for example, an alkali metal salt (e.g. sodium salt or potassium salt), an alkaline earth metal salt (e.g. calcium salt or magnesium salt), an ammonium salt; a salt with an organic base, for example, or an organic amine salt (e.g. triethylamine salt, pyridine salt, picoline salt, ethanolamine salt, triethanolamine salt, dicyclohexylamine salt, or N,N'-dibenzylethylenediaminesalt); an organic acid addition salt (e.g. acetate, maleate, tartrate, methanesulfonate, benzenesulfonate, formate, or toluenesulfonate), an inorganic acid addition salt (e.g. hydrochloride, hydrobromide, sulfate, or phosphate), or a salt with an amino acid (e.g. arginine, aspartic acid, glutamic acid).

In the above and subsequent descriptions of the present specification, suitable examples and illustrations of the various definitions which the present invention includes within the scope thereof are explained in detail as follows.

Suitable (C_1 - C_6) alkyl may include methyl, ethyl, propyl, isopropyl, n-butyl, t-butyl, pentyl or hexyl, in which the preferred one may be C_1-C_4alkyl and the more preferred one may be methyl and ethyl.

Suitable (C_2-C_6) alkenyl"

may include vinyl, allyl, isopropenyl, 1(or 2 or 3)-butenyl, 1(or 2 or 3 or 4)-pentenyl, or 1(or 2 or 3 or 4 or 5)-hexenyl, in which the preferred one may be C_2-C_4alkenyl and the more preferred one may be allyl.

Suitable (C_2-C_6) alkynyl"

may include ethynyl, 1(or 2)-propynyl, 1(or 2 or 3)-butynyl, 1-methyl-2-propynyl, 1(or 2 or 3 or 4)-pentynyl, or 1(or 2 or 3 or 4 or 5)-hexynyl, in which the preferred one may be C_2-C_4alkynyl and the more preferred one may be 2-propynyl.

Suitable (C_3-C_6) alkadienyl"

may include 1,2-propadienyl, 1,2-butadienyl, 1,3-butadienyl, 2,3-pentadienyl, 1,4-pentadienyl, 1,2-hexadienyl, 1,3-hexadienyl, or 1,4-hexadienyl,

in which the preferred one may be C_3-C_5 alkadienyl and the more preferred one may be 1,2-propadienyl.

"Cumulated (C_3-C_6) alkadienyl" means the above-defined (C_3-C_6) alkadienyl" group in which two double bonds are adjacent to each other through one carbon atom, and suitable examples of such "cumulated (C_3-C_6)-alkadienyl" may include 1,2-propadienyl, 1,2-butadienyl, 2,3-pentadienyl, or 1,2-hexadienyl,

in which the preferred one may be cumulated C_3-C_5alkadienyl and the more preferred one may be 1,2-propadienyl.

In the term (C_2-C_6) alkenyloxy (C_1-C_6) alkyl", suitable (C_2-C_6) alkenyi" moiety and (C_1-C_6) alkyi" moiety can be referred to the ones as mentioned above, respectively, and suitable examples of such "(C_2-C_6) alkenyloxy (C_1-C_6)alkyl" may include vinyloxymethyl, allyloxymethyl, 1-allyloxyethyl, 1-allyloxypropyl, 3-allyloxybutyl, 3-(2-butenyloxy)butyl, 5-(3-pentenyloxy)pentyl, or 1-(2-hexenyloxy)hexyl, in which the preferred one may be (C_2-C_4)alkenyloxy(C_1-C_4)alkyl and the more preferred one may be allyloxymethyl.

In the term (C_2-C_6) alkynyloxy (C_1-C_6) alkyl", suitable (C_2-C_6) alkynyl" moiety and (C_1-C_6) alkyl" moiety can be referred to the ones as mentioned above, respectively, and suitable examples of such (C_2-C_6) alkynyloxy (C_1-C_6)alkyl" may include ethynyloxymethyl, 2-propynyloxymethyl, 2-(2-propynyloxy)ethyl, 1-(2-butynyloxy)propyl, 1-(3-butynyloxy)propyl, 2-(3-butynyloxy)butyl, 3-(3-butynyloxy)butyl, 4-(1-pentynyloxy)pentyl, 4-(4-pentynyloxy)pentyl, 5-(5-hexynyloxy)hexyl, or 6-(5-hexynyloxy)hexyl,

in which the preferred one may be (C_2-C_4)alkynyloxy(C_1-C_4)alkyl and the more preferred one may be 2-propynyloxymethyl.

"Carboxy (C_2-C_6) alkynyloxy (C_1-C_6) alkyl" means the above-defined (C_2-C_6) alkynyloxy (C_1-C_6) alkyl group which is substituted with carboxy, and suitable examples of such "carboxy (C_2-C_6) alkynyloxy (C_1-C_6) alkyl" may include carboxyethynyloxymethyl, 3-carboxy-2-propynyloxymethyl, 1-carboxy-2-propynyloxymethyl, 2-(3-carboxy-2-propynyloxy)ethyl, 1-(1-carboxy-2-butynyloxy)propyl, 1-(4-carboxy-3-butynyloxy)-propyl, 2-(4-carboxy-3-butynyloxy)butyl, 3-(4-carboxy-3-butynyloxy)butyl, 4-(3-carboxy-1-pentynyloxy)pentyl, 4-(5-carboxy-4-pentynyloxy)pentyl, 5-(1-carboxy-5-hexynyloxy)hexyl, or 6-(6-carboxy-5-hexynyloxy)hexyl, in which the preferred one may be carboxy(C_2-C_4)alkynyloxy(C_1-C_4)alkyl and the more preferred one may be 3-carboxy-2-propynyloxymethyl.

Suitable examples of (C_1-C_6) alkoxycarbonyl (C_2-C_6) alkynyloxy (C_1-C_6)alkyl may be methoxycarbonylethynyloxymethyl, 3-ethoxycarbonyl-2-propynyloxymethyl, 1-ethoxycarbonyl-2-propynyloxymethyl, 2-(3-ethoxycarbonyl-2-propynyloxy)ethyl, 1-(1-propoxycarbonyl-2-butynyloxy)propyl, 1-(4-ethoxycarbonyl-3-butynyloxy)propyl, 2-(4-butoxycarbonyl-3-butynyloxy)butyl, 3-(4-tert-butoxycarbonyl-3-butynyloxy)butyl, 4-(3-pentyloxycarbonyl-1-pentynyloxy)pentyl, 4-(5-ethoxycarbonyl-4-pentynyloxy)pentyl, 5-(1-hexyloxycarbonyl-5-hexynyloxy)hexyl, or 6-(6-hexyloxycarbonyl-5-hexynyloxy)hexyl, in which the preferred one may be (C_1-C_4)alkoxycarbonyl(C_2-C_4)alkynyloxy(C_1-C_4)alkyl and the more preferred one may be 3-ethoxycarbonyl-2-propynyloxymethyl.

Suitable "carboxy (C_2-C_6) alkynyl" may be the same as that in the terms of "carboxy (C_2-C_6))-alkynyloxy (C_1-C_6))-alkyl" and may include carboxyethynyl, 3-carboxy-2-propynyl, 1-carboxy-2-propynyl, 1-carboxy-2-butynyl, 4-carboxy-3-butynyl, 3-carboxy-1-pentynyl, 1-carboxy-5-hexynyl, or 6-carboxy-5-hexynyl, in which the preferred one may be carboxy(C_2-C_4)alkynyl and the more preferred one may be 3-carboxy-2-propynyl.

Suitable (C_1-C_6) alkoxycarbonyl (C_2-C_6))alkynyl may include methoxycarbonylethynyl, 3-ethoxycarbonyl-2-propynyl, 1-ethoxycarbonyl-2-propynyl, 1-propoxycarbonyl-2-butynyl, 4-ethoxycarbonyl-3-butynyl, 4-butoxycarbonyl-3-butynyl, 4-tert-butoxycarbonyl-3-butynyl, 3-pentyloxycarbonyl-1-pentynyl, 1-hexyloxycarbonyl-5-hexynyl, or 6-hexyloxycarbonyl-5-hexynyl, in which the preferred one may be (C_1-C_4)-alkoxycarbonyl(C_2-C_4)alkynyl and the more preferred one may be 3-ethoxycarbonyl-2-propynyl.

"(ω-(C_2-C_6)Alkynyloxy)(C_1-C_6))alkyl" means the above-defined lower alkynyloxy(C_1-C_6))alkyl group, in which the triple bond always exists on the terminal carbon atom of the (C_2-C_6) alkynyl moiety, and suitable examples of such "(ω-(C_2-C_6)alkynyloxy) (C_1-C_6) alkyl" may include ethynyloxymethyl, 2-propynylox-

ymethyl, 2-(2-propynyloxy)ethyl, 1-(3-butynyloxy)propyl, 2-(3-butynyloxy)butyl, 4-(4-pentynyloxy)pentyl, or 6-(5-hexynyloxy)hexyl, in which the preferred one may be [ω-(C_2-C_4)alkynyloxy](C_1-C_4)alkyl and the more preferred one may be 2-propynyloxymethyl.

"(ω-Carboxy-ω-(C_2-C_6 alkynyloxy) (C_1-C_6) alkyl" means the above-defined ω-(C_2-C_6)alkynyloxy(C_1-C_6) alkyl group which is substituted with carboxy on the terminal carbon atom of the (C_2-C_6) alkynyl moiety, and suitable examples of such "(ω-carboxy-ω-(C_2-C_6)alkynyloxy)(C_1-C_6) alkyl" may include carboxyethynyloxymethyl, 3-carboxy-2-propynyloxymethyl, 2-(3-carboxy-2-propynyloxy)ethyl, 1-(4-carboxy-3-butynyloxy)propyl, 2-(4-carboxy-3-butynyloxy)butyl, 4-(5-carboxy-4-pentynyloxy)pentyl, or 6-(6-carboxy-5-hexynyloxy)hexyl, in which the preferred one may be [ω-carboxy-ω-(C_2-C_4)alkynyloxy](C_1-C_4)alkyl and the more preferred one may be 3-carboxy-2-propynyloxymethyl.

"(ω-(C_1-C_6)Alkoxycarbonyl-ω-(C_2-C_6) alkynyloxy (C_1-C_6)-alkyl" means the above-defined ω-(C_1-C_6)-alkoxycarbonyl (C_1-C_6)-alkyl-group which is substituted with (C_1-C_6)alkoxycarbonyl as mentioned above on the terminal carbon atom of the (C_2-C_6) alkynyl moiety, and suitable examples of such (ω-(C_1-C_6) alkoxycarbonyl-ω-(C_2-C_6) alkynyloxy) (C_1-6_6) alkyl may be such as methoxycarbonylethynyloxymethyl, 3-ethoxycarbonyl-2-propynyloxymethyl, 2-(3-ethoxycarbonyl-2-propynyloxy)ethyl, 1-(4-propoxycarbonyl-3-butynyloxy)propyl, 3-(4-tert-butoxycarbonyl-3-butynyloxy)butyl, 4-(5-pentyloxycarbonyl-4-pentynyloxy)pentyl, or 5-(6-hexyloxycarbonyl-5-hexynyloxy)hexyl, in which the preferred one may be [ω-(C_1-C_4)alkoxycarbonyl-ω-(C_2-C_4)alkynyloxy](C_1-C_4)alkyl and the more preferred one may be 3-ethoxycarbonyl-2-propynyloxymethyl.

Suitable "aryl" may include phenyl, tolyl, xylyl, 1-naphthyl, 2-naphthyl, 1-anthryl, or 2-anthryl, in which the preferred one may be phenyl.

Suitable "ar (C_1-C_6) alkyl" may include mono-(or di- or tri-)phenyl (C_1-C_6)alkyl such as benzyl, 1-phenylethyl, 2-phenylethyl, 2-phenylpropyl, 3-phenylbutyl, 1-methyl-2-phenylpropyl, 5-phenylpentyl, 4-phenylhexyl, benzhydryl, 2,3-diphenylpropyl, trityl, or 1,2,3-triphenylbutyl or naphthyl (C_1-C_6) alkyl such as 1-naphthylmethyl, 2-naphthylmethyl, 1-(2-naphthyl)ethyl, 3-(1-naphthyl)propyl, 2-(2-naphthyl)butyl, 5-(1-naphthyl)pentyl, or 4-(2-naphthyl)hexyl ;

in which the preferred one may be phenyl(C_1-C_4)alkyl and naphthyl(C_1-C_4)alkyl, and the more preferred one may be benzyl, 1-phenylethyl, 2-phenylethyl, 1-naphthylmethyl and 2-naphthylmethyl.

Said "ar (C_1-C_6)alkyl" may have one or more (preferably 1 to 3) suitable substituent(s) selected from a group consisting of (C_1-C_6) alkyl (e.g. methyl, ethyl, propyl, isopropyl, butyl, pentyl, or hexyl) and halogen (e.g. fluoro, chloro, bromo, iodo), and the preferred examples of said substituted ar(C_1-C_6)alkyl may be mono or di halophenyl(lower)alkyl (e.g. 2-chlorobenzyl, 3-chlorobenzyl, 4-chlorobenzyl, 2-bromobenzyl, 4-bromobenzyl, 2-fluorobenzyl, 4-fluorobenzyl, 4-iodobenzyl, 2-chlorophenethyl, 2,3-dichlorobenzyl, 2,4-dichlorobenzyl, 3,4-dichlorobenzyl, 2,6-dichlorobenzyl, 2-chloro-4-fluorobenzyl, mono or di (C_1-C_6) alkylphenyl (C_1-C_6) alkyl (e.g. 2-methylbenzyl, 3-methylbenzyl, 4-methylbenzyl, 2-methylphenethyl, 2-ethylbenzyl, 2-propylbenzyl, 2-isopropylbenzyl, 3-butylbenzyl, 4-pentylbenzyl, 2-hexylbenzyl, 2,3-dimethylbenzyl, 2,6-dimethylbenzyl, 2,4-diethylbenzyl, or 2-methyl-4-propylbenzyl , and the more preferred one may be mono or dihalophenyl(C_1-C_4)alkyl and mono or di(C_1-C_4)alkyl phenyl(C_1-C_4)alkyl, and the most preferred one may be 2-chlorobenzyl, 3-chlorobenzyl, 2-bromobenzyl, 2-fluorobenzyl, 2,4-dichlorobenzyl, 3,4-dichlorobenzyl, 2,6-dichlorobenzyl, 2-methylbenzyl, 2-ethylbenzyl, 2-isopropylbenzyl and 2,6-dimethylbenzyl.

Suitable "ar (C_2-C_6) alkenyl" may include mono (or di or tri)-phenyl(C_2-C_6) alkenyl such as styryl, cinnamyl, phenylbutenyl (e.g. 4-phenyl-2-butenyl, or 2-phenyl-3-butenyl, phenylpentenyl (e.g. 1-phenyl-1-pentenyl, phenylhexenyl (e.g. 4-phenyl-2-hexenyl, 2,3-diphenyl-1-butenyl, or 2,3,4-triphenyl-4-pentenyl, in which the preferred one may be phenyl(C_2-C_4)alkenyl and the more preferred one may be cinnamyl.

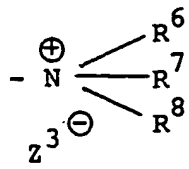
Suitable "benzene-condensed cyclo (C_5-C_6)alkyl" may include naphthyl, 1,4-dihydronaphthyl, indenyl, benzene-condensed cyclo (C_5-C_6) alkyl (e.g. 1,2,3,4-tetrahydronaphthyl, 2,3-dihydroindenyl, or perhydroindenyl in which the preferred one may be benzene-condensed cyclo(C_5-C_6)alkyl and the more preferred one may be 1,2,3,4-tetrahydronaphthyl.

Suitable "(C_1-C_6)alkyl having cyclo (C_3-C_6)alkyl" may include cyclopropylmethyl, cyclobutylmethyl, cyclopentylethyl, cyclohexylmethyl, cyclohexylethyl, cyclohexylpropyl, cyclohexylbutyl, cyclohexylpentyl, or cyclohexylhexyl, in which the preferred one may be cyclo(C_5-C_6)alkyl(C_1-C_4)alkyl and the more preferred one may be cyclohexylmethyl.

Suitable "(C_1-C_6)alkylene" may include methylene, ethylene, trimethylene, propylene, tetramethylene, pentamethylene, or hexamethylene in which the preferred one may be C_1-C_4alkylene and the more preferred one may be methylene.

Suitable "an acid residue" may include halogen (e.g. fluorine, chlorine, bromine, iodine), or acyloxy (e.g. acetoxy, tosyloxy, mesyloxy, etc.).

Suitable "a leaving group" may include an acid residue as mentioned above, a group of the formula:



wherein

R^6, R^7 and R^8 are each (C_1-C_6) alkyl as mentioned above, and

Z^3 is an acid residue as mentioned above .

The processes for preparing the object compounds of the present invention are explained in detail in the following.

Process 1

The object compound (I) or a salt thereof can be prepared by reacting the compound (II) or a salt thereof with the compound (III) or a salt thereof.

Suitable salts of the compound (II) can be referred to the acid addition salt as exemplified for the compound (I) and those of the compound (III) can be referred to the salt with a base for the same.

This reaction is usually carried out in a solvent such as alcohol [e.g. methanol, or ethanol, benzene, N,N-dimethylformamide, tetrahydrofuran, diethyl ether or any other solvent which does not adversely affect the reaction.

The reaction may be carried out in the presence of an inorganic or an organic base such as an alkali metal hydroxide [e.g. sodium hydroxide, or potassium hydroxide], an alkali metal carbonate [e.g. sodium carbonate, or potassium carbonate], an alkali metal bicarbonate [e.g. sodium bicarbonate, or potassium bicarbonate], tri (C_1-C_6)alkylamine [e.g. trimethylamine, or triethylamine], pyridine or its derivative [e.g. picoline, lutidine, or 4-dimethylaminopyridine], In case that the base to be used is liquid, it can also be used as a solvent.

The reaction temperature is not critical, and the reaction can be carried out under cooling, at ambient temperature or under warming or heating.

Process 2

The object compound (Ib) or a salt thereof can be prepared by subjecting the compound (Ia) or a salt thereof to isomerization reaction of (C_2-C_6) alkynyl into cumulated (C_3-C_6) alkadienyl.

Suitable salts of the compounds (Ia) and (Ib) can be referred to the acid addition salts as exemplified for the compound (I).

This reaction is usually carried out in the presence of a base such as an alkali metal hydroxide (e.g. sodium hydroxide, or potassium hydroxide, or an alkali metal carbonate (e.g. sodium carbonate, potassium carbonate).

This reaction is usually carried out in a solvent such as alcohol (e.g. methanol, or ethanol). N,N-dimethylformamide or any other solvent which does not adversely affect the reaction.

The reaction temperature is not critical, and the reaction can be carried out at ambient temperature or under warming or heating.

Process 3

The object compound (Ic) or a salt thereof can be prepared by reacting the compound (IV) or a salt thereof with the compound (V) or a salt thereof.

Suitable salts of the compound (IV) can be referred to the acid addition salts as exemplified for the object compound (I).

Suitable salts of the compound (Ic) can be referred to the ones as exemplified for the object compound (I).

Suitable salts of the compound (V) are salts with a base such as an alkali metal salt (e.g. sodium salt, potassium salt, or lithium salt).

This reaction is usually carried out in the presence of a base such as alkali metal hydride (e.g. sodium hydride, potassium hydride, or lithium hydride), alkali metal alkoxide (e.g. potassium t-butoxide or an alkali

metal (e.g. sodium, or potassium, lithium).

This reaction is usually carried out in a solvent such as alcohol [e.g. methanol, or ethanol], dimethyl sulfoxide, benzene, N,N-dimethylformamide, tetrahydrofuran, diethyl ether or any other solvent which does not adversely affect the reaction.

In case that the compound (V) or a salt thereof to be used is liquid, it can also be used as a solvent.

The reaction temperature is not critical, and the reaction can be carried out under cooling, at ambient temperature or under warming or heating.

Process 4

The object compound (Ie) or a salt thereof can be prepared by subjecting the compound (Id) or a salt thereof to acylation reaction.

Suitable salts of the compound (Id) can be referred to the acid addition salts as exemplified for the compound (I).

Suitable salts of the compound (Ie) can be referred to the ones as exemplified for the compound (I).

The acylation reaction of this process can be carried out by reacting the compound (Id) or a salt thereof with a conventional agent which can introduce a carboxy or a protected carboxy group into a terminal carbon atom of (C_2-C_6) alkynyl such as carbon dioxide gas, dry ice, (C_1-C_6)alkoxy(halo)formate (e.g. ethyl chloroformate, di(C_1-C_6))alkyl carbonate (e.g. dimethyl carbonate, or diethyl carbonate), di(C_1-C_6))alkyl oxalate (e.g. diethyl oxalate) or tri (C_1-C_6) alkyl phosphonoacetate (e.g. triethyl phosphonoacetate).

This reaction is usually carried out in the presence of a base such as metalated (C_1-C_6) alkyl (e.g. methyl lithium, or n-butyl lithium , metalated aryl (e.g. phenyl lithium), or alkali metal hydride (e.g. sodium hydride, or potassium hydride).

This reaction is usually carried out in a solvent such as diethyl ether, tetrahydrofuran, N,N-dimethylformamide, n-hexane or any other solvent which does not adversely affect the reaction.

The reaction temperature is not critical, and the reaction can be carried out under cooling or at ambient temperature.

The object compounds (I) and their pharmaceutically acceptable salts of the present invention are novel and exhibit high antiulcerative activity.

In order to illustrate the usefulness of the object compounds (I), the pharmacological data of some representative compounds of the object compounds (I) are shown in the following.

(A) Inhibition on ethanol ulcer

Test Method :

Five male Sprague-Dawley rats, aged 7 weeks and weighing about 200 g, were used per group for the study on ethanol ulcer after the fast for 24 hours.

Test compound was suspended in 0.1% methylcellulose aqueous solution, and the suspension (5 ml/kg) was orally given to each rat.

The control group was given a vehicle, i.e. 0.1% methylcellulose aqueous solution (5 ml/kg), alone in the same way.

Absolute ethanol (5 ml/kg) was orally administered 30 minutes after dosing with test compound, and one hour later, the rats were sacrificed and their stomachs were removed. The area of ulcers of each rat was measured. The mean area (mm) in the medicated group was compared with that in the control group.

Test compounds

(1) 8-(2-Methylbenzyloxy)-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a] pyridine
(2) 8-(2-Chlorobenzyloxy)-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine
(3) 8-(2-Methylbenzyloxy)-3-(2-propynyl)-2-methylimidazo[1,2-a]pyridine

Test Results

A) Inhibition % at the dose of 32 mg/kg :

Test Compound	Inhibition %
(1)	94.4
(2)	98.2
(3)	91.8

B) The ED_{50} value of the Test Compound (1) : 1.1 mg/kg

(B) Inhibition on stress ulcer

Test Method :

Five Sprague-Dawley rats weighing about 200 g were used per group. Each animal was immobilized in a small cage and put in a water bath allowing to respire. The temperature of the water bath kept at 22° C. The test compound was administered orally just before the immobilization. Seven hours later, the animals were sacrificed and their stomachs were removed. The stomach was then fixed with 2% formalin. The area of ulcers was measured for each animal. The mean area (mm^2) in the medicated animals was compared with that in the control animals.

Test Compounds

(1) 8-(2-Methylbenzyloxy)-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine
(2) 8-(2-Chlorobenzyloxy)-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine
(3) 8-(2-Methylbenzyloxy)-3-(2-propynyl)-2-methylimidazo[1,2-a]pyridine

Test Results

A) Inhibition % at the dose of 32 mg/kg :

Test Compound	Inhibition %
(1)	100
(2)	100
(3)	100

B) The ED_{50} value of the Test Compound (1) : 0.15 mg/kg

As being apparent from the above test results, the object compound (I) of the present invention are useful as an antiulcerative agent.

For therapeutic purpose, the compounds according to the present invention can be used in a form of pharmaceutical preparation containing said compound as an active ingredient, in admixture with a pharmaceutically acceptable carrier such as an organic or inorganic solid or liquid excipient suitable for oral or parenteral administration. The pharmaceutical preparations may be capsules, tablets, dragees, solution, suspension, emulsion, and the like. If desired, there may be included in the above preparations auxiliary substances, stabilizing agents, wetting or emulsifying agents, buffers and other commonly used additives.

While the dosage of the compounds will vary depending upon the age and condition of the patient, an average single dose of about 5 mg, 10 mg, 50 mg, 100 mg, 250 mg, 500 mg, and 1000 mg of the compounds according to the present invention may be effective for treating ulcer. In general, amounts between 1 mg/body and about 2,000 mg/body or even more may be administered per day.

The following preparations and examples are given for the purpose of illustrating the present invention.

Preparation 1

A solution of 5-hexen-2-one (3.92 g) in N,N-dimethylformamide (4 ml) was added to mixture of cupric

chloride dihydrate (13.636 g) and lithium chloride (3.392 g) in N,N-dimethylformamide (20 ml) at 80° C. After being stirred at 80-90° C for 1 hour, the mixture was poured into cold water and extracted with ethyl acetate. The extract was washed with water, dried over magnesium sulfate and evaporated in vacuo to give a crude oil of 3-chloro-5-hexen-2-one (3.01 g) which was used for the next step without purification.

Preparation 2

Tosyl chloride (3.81 g) was added to a solution of 3-hydroxy-5-hexyn-2-one (2.24 g) and triethylamine (2.424 g) in methylene chloride (20 ml) under ice-cooling. After being stirred for 2.5 hours, the mixture was washed with water, dried over magnesium sulfate and evaporated in vacuo. The oily residue was purified by column chromatography on silica gel (60 g) using methylene chloride as an eluent to give an oil of 3-tosyloxy-5-hexyn-2-one (2.94 g).
IR (film/NaCl) : 3280, 1720, 1590, 1360 (broad) cm^{-1}
NMR (CCl_4, δ) : 1.79 (1H, t, J = 2Hz), 2.25 (3H, s), 2.43 (3H, s), 2.3-2.6 (2H, m), 4.66 (1H, t, J = 5Hz), 7.31 (2H, d, J = 8Hz), 7.78 (2H, d, J = 8Hz).

Preparation 3

Mesyl chloride (1.73 ml) was added dropwise to a solution of 3-hydroxy-2-methoxy-1-hexen-5-yne (2 g) and triethylamine (3.32 ml) in methylene chloride (20 ml) under ice-cooling over a period of 10 minutes. After being stirred for 48 hours at room temperature the mixture was washed successively with water, aqueous sodium bicarbonate solution, and brine, dried over magnesium sulfate, and evaporated in vacuo to give 3-mesyloxy-2-methoxy-1-hexen-5-yne (3.45 g).
IR (film/NaCl) : 3280, 2110 cm^{-1}
NMR (CCl_4, δ) : 1.96 (1H, t, J = 3Hz), 2.63-2.80 (2H, m), 2.95 (3H, s), 3.62 (3H, s), 4.22 (1H, d, J = 3Hz), 4.40 (1H, d, J = 3Hz), 4.93 (1H, t, J = 6Hz)

Preparation 4

To a solution of 3-mesyloxy-2-methoxy-1-hexen-5-yne (0.5 g) in acetone (1.5 ml) was added 20% sulfuric acid (1.5 ml) under ice-cooling and the mixture was stirred for 1.5 hours under the same conditions and then for 1.5 hours at room temperature. Acetone was evaporated in vacuo and the residue was extracted with methylene chloride. The extract was washed successively with water, aqueous sodium bicarbonate solution, and brine, dried over magnesium sulfate, and evaporated in vacuo to give 3-mesyloxy-5-hexyn-2-one (0.41 g).
IR (film/NaCl) : 3290, 2120, 1720 cm^{-1}
NMR (CCl_4, δ) : 2.03 (1H, t, J = 3Hz), 2.31 (3H, s) 2.70-2.86 (2H, m), 3.11 (3H, s), 4.92 (1H, t, J = 6Hz)

Preparation 5

To a mixture of 2-amino-3-hydroxypyridine (7 g) and Adogen 464 (Trademark : prepared by Aldrich Chemical Co.) (0.4 g) in 40% aqueous sodium hydroxide (32 ml) and methylene chloride (32 ml) was added 2-methylbenzyl chloride (8.42 ml) at ambient temperature. After being stirred for 24 hours, the organic layer was separated and the aqueous layer was extracted with methylene chloride. The combined extracts were washed with saturated sodium chloride aqueous solution, dried over magnesium sulfate, and evaporated in vacuo. The crystalline residue was recrystallized from ethyl acetate to give 2-amino-3-(2-methylbenzyloxy)-pyridine (7.56 g).
mp : 100 to 101° C
IR (Nujol) : 3450, 3275, 3125, 1625 cm^{-1}
NMR ($CDCl_3$, δ) : 2.40 (3H, s), 4.68 (2H, s), 5.05 (2H, s), 6.43-6.73 (1H, m), 6.98 (1H, dd, J = 2Hz and 8Hz), 7.10-7.46 (4H, m), 7.66 (1H, dd, J = 2Hz and 5Hz)

Preparation 6

The following compounds were prepared according to a similar manner to that of Preparation 5.
(1) 2-Amino-3-(2-ethylbenzyloxy)pyridine
mp : 93 to 95° C (recrystallized from a mixture of ethyl acetate and n-hexane)
IR (Nujol) : 3475, 3275, 3130, 1620 cm^{-1}

NMR ($CDCl_3$, δ) : 1.27 (3H, t, J = 8Hz), 2.73 (2H, q, J = 8Hz), 4.68 (2H, broad s), 5.07 (2H, s), 6.43-6.73 (1H, m), 6.99 (1H, d, J = 7Hz), 7.12-7.50 (4H, m), 7.66 (1H, dd, J = 2Hz and 5Hz)

(2) 2-Amino-3-(2-isopropylbenzyloxy)pyridine

mp : 106 to 107° C (recrystallized from a mixture of ethyl acetate and n-hexane)

IR (Nujol) : 3450, 3275, 3120, 1620 cm^{-1}

NMR ($CDCl_3$, δ) : 1.25 (6H, d, J = 6Hz), 2.50-3.45 (1H, m), 4.63 (2H, broad s), 5.05 (2H, s), 6.43-6.75 (1H, m), 7.02 (1H, d, J = 8Hz), 7.15-7.48 (4H, m), 7.66 (1H, dd, J = 2Hz and 5Hz)

(3) 2-Amino-3-(2-chlorobenzyloxy)pyridine

mp : 100 to 101° C (recrystallized from methylene chloride)

IR (Nujol) : 3465, 3275, 3120, 1620 cm^{-1}

NMR ($CDCl_3$, δ) : 4.73 (2H, broad s), 5.15 (2H, s), 6.40-6.70 (1H, m), 6.92 (1H, dd, J = 2Hz and 8Hz), 7.10-7.50 (4H, m), 7.65 (1H, dd, J = 2Hz and 5Hz)

(4) 2-Amino-3-(3-chlorobenzyloxy)pyridine

mp : 87.5 to 89° C (recrystallized from a mixture of methylene chloride and n-hexane)

IR (Nujol) : 3480, 3275, 3100, 1622 cm^{-1}

NMR ($CDCl_3$, δ) : 4.88 (2H, broad s), 4.97 (2H, s), 6.40-6.63 (1H, m), 6.89 (1H, d, J = 8Hz), 7.27 (3H, s), 7.38 (1H, s), 7.65 (1H, dd, J = 2Hz and 5Hz)

(5) 2-Amino-3-(2-bromobenzyloxy)pyridine

mp : 107 to 108° C (recrystallized from ethyl acetate)

IR (Nujol) : 3440, 3270, 3125, 1617 cm^{-1}

NMR ($CDCl_3$, δ) : 4.80 (2H, broad s), 5.11 (2H, s), 6.46-6.70 (1H, m), 6.94 (1H, dd, J = 1.5Hz and 7.5Hz), 7.06-7.76 (5H, m)

(6) 2-Amino-3-(2,6-dimethylbenzyloxy)pyridine

mp : 151 to 155° C (recrystallized from a mixture of ethyl acetate and n-hexane)

IR (Nujol) : 3470, 3280, 3145, 1620 cm^{-1}

NMR ($CDCl_3$, δ) : 2.47 (6H, s), 4.68 (2H, broad s), 5.01 (2H, s), 6.48-6.71 (1H, m), 6.97-7.28 (4H, m), 7.68 (1H, dd, J = 2Hz and 5Hz)

(7) 2-Amino-3-(2,6-dichlorobenzyloxy)pyridine

mp : 146 to 148° C (recrystallized from methanol)

IR (Nujol) : 3455, 3270, 3125, 1620 cm^{-1}

NMR ($CDCl_3$, δ) : 4.70 (2H, broad s), 5.28 (2H, s), 6.45-6.73 (1H, m), 7.02-7.53 (4H, m), 7.67 (1H, dd, J = 2Hz and 5Hz)

(8) 2-Amino-3-(2-naphthylmethoxy)pyridine

mp : 138 to 139° C

NMR ($CDCl_3$, δ) : 4.73 (2H, broad s), 5.22 (2H, s), 6.40-6.70 (1H, m), 6.96 (1H, dd, J = 2Hz and 7Hz), 7.30-8.0 (8H, m)

(9) 2-Amino-3-(1-naphthylmethoxy)pyridine

mp : 146 to 148° C (recrystallized from ethyl acetate)

NMR ($CDCl_3$, δ) : 4.72 (2H, broad s), 5.38 (2H, s), 6.36 (1H, dd, J = 5Hz and 8Hz), 7.02 (1H, d, J = 8Hz), 7.30-8.13 (8H, m)

(10) 2-Amino-3-cinnamyloxypyridine (trans isomer)

mp : 127 to 129° C (recrystallized from a mixture of ethyl acetate and n-hexane)

IR (Nujol) : 3475, 3275, 3120, 1620 cm^{-1}

NMR ($CDCl_3$, δ) : 4.66 (2H, d, J = 5Hz), 4.79 (2H, broad s), 6.14-7.02 (4H, m), 7.20-7.48 (5H, m), 7.66 (1H, dd, J = 2Hz and 5Hz)

(11) 2-Amino-3-(1,2,3,4-tetrahydro-1-naphthyloxy)pyridine

mp : 106.5 to 107° C (recrystallized from a mixture of ethyl acetate and n-hexane)

IR (Nujol) : 3475, 3300, 3140, 1626 cm^{-1}

NMR ($CDCl_3$, δ) : 1.60-2.36 (4H, m), 2.63-3.06 (2H, m), 4.63 (2H, broad s), 5.20-5.46 (2H, m), 6.46-6.75 (1H, m), 6.98-7.50 (5H, m), 7.65 (1H, dd, J = 1Hz and 5Hz)

(12) 2-Amino-3-cyclohexylmethoxypyridine

mp : 110 to 112° C

NMR ($CDCl_3$, δ) : 0.63-2.10 (11H, m), 3.78 (2H, d, J = 6Hz), 4.69 (2H, broad s), 6.43-6.73 (1H, m), 6.90 (1H, dd, J = 2Hz and 8Hz), 7.64 (1H, dd, J = 2Hz and 5Hz)

Preparation 7

Molecular Sieves (16 g) was added to a solution of 2,3-diaminopyridine (8 g), 2-methylbenzaldehyde

(8.81 g), and acetic acid (4.2 ml) in methanol (160 ml) and the mixture was stirred for 96 hours at room temperature. Sodium cyanoborohydride (4.61 g) was added portionwise to the mixture with stirring under ice-cooling over a period of 20 minutes. After being stirred for 3 hours, the mixture was made alkaline with aqueous sodium bicarbonate solution and filtered by suction. The filtrate was evaporated in vacuo, and to the residue was added water and then extracted with methylene chloride. The extract was washed with brine, dried over magnesium sulfate, and evaporated in vacuo. The crystalline residue was recrystallized from a mixture of ethyl acetate and n-hexane to give 2-amino-3-(2-methylbenzylamino)pyridine (5.38 g).
mp : 135 to 140° C
NMR ($CDCl_3$, δ) : 2.36 (3H, s), 3.20-3.63 (1H, broad s), 4.20 (2H, broad d, J = 4Hz), 4.40-5.20 (2H, broad s), 6.50-6.93 (2H, m), 7.0-7.63 (5H, m)

Preparation 8

2-Amino-3-(2-chlorobenzylamino)pyridine was obtained according to a similar manner to that of Preparation 7.
mp : 144 to 147° C
NMR ($CDCl_3$, δ) : 3.60-4.60 (3H, m), 4.36 (2H, d, J = 6Hz), 6.43-6.83 (2H, m), 6.96-7.86 (5H, m)

Preparation 9

To a solution of 2-methylbenzyl alcohol (0.985 g) in N,N-dimethylformamide (10 ml) was added 62.8% sodium hydride (0.308 g) under a nitrogen atmosphere and then stirred for 30 minutes. 2-Amino-3-chloropyrazine (0.87 g) was added to the solution and the mixture was heated at 65° C for 2 hours and poured onto crushed ice. The resulting precipitates were collected by filtration, washed with n-hexane, and dried in a desiccator to give 2-amino-3-(2-methylbenzyloxy)pyrazine (0.6 g).
mp : 70 to 72° C
NMR ($CDCl_3$, δ) : 2.37 (3H, s), 4.40-5.00 (2H, broad s), 5.34 (2H, s), 7.00-7.45 (4H, m), 7.35 (1H, d, J = 3Hz), 7.48 (1H, d, J = 3Hz)

Preparation 10

A mixture of 2-amino-3-chloropyrazine (4.3 g), 2-methylbenzylamine (4.6 g), potassium carbonate (5.5 g), and potassium iodide (0.4 g)) in N,N-dimethylformamide (43 ml) was refluxed for 24 hours under a nitrogen atmosphere and allowed to stand at room temperature. The mixture was poured into water and extracted with ethyl acetate. The extract was washed with water, dried over magnesium sulfate, and evaporated in vacuo. The residue was purified by column chromatography on silica gel (110 g) with a mixture of chloroform and methanol (100:3) as an eluent to give 2-amino-3-(2-methylbenzylamino)pyrazine (1.4 g).
NMR ($CDCl_3$, δ) : 2.33 (3H, s), 3.80-4.50 (3H, broad s), 4.50 (2H, d, J = 5Hz), 6.95-7.35 (4H, m), 7.30 (1H, d, J = 3Hz), 7.50 (1H, d, J = 3Hz)

Preparation 11

A 60% dispersion of sodium hydride in mineral oil (1.87 g) was added portionwise to a suspension of 8-hydroxy-2-methylimidazo[1,2-a]pyridine (6.3 g) in dimethyl sulfoxide (63 ml) at room temperature over a period of 15 minutes. After being stirred for 30 minutes, 2-chlorobenzyl chloride (7.54 g) was added in one portion to the mixture and then the resultant mixture was stirred for 24 hours at room temperature. The mixture was poured into water and the resulting precipitate was collected by filtration. The crude product was purified by column chromatography on silica gel (30 g) with methylene chloride as an eluent to afford a solid, which was recrystallized from a mixture of diethyl ether and n-hexane to give 8-(2-chlorobenzyloxy)-2-methylimidazo[1,2-a]pyridine (7.75 g).
mp : 97 to 98° C
IR (Nujol) : 1535, 1280, 1260, 1100 cm^{-1}
NMR ($CDCl_3$, δ) : 2.46 (3H, s), 5.41 (2H, s), 6.26-6.73 (2H, m), 7.05-7.50 (4H, m), 7.52-7.83 (2H, m)

Preparation 12

The following compounds were obtained according to a similar manner to that of Preparation 11.

(1) 8-(2-Methylbenzyloxy)-2-methylimidazo[1,2-a]pyridine
mp : 101 to 103 °C (recrystallized from a mixture of ethyl acetate and n-hexane)
IR (Nujol) : 1530, 1485, 1275, 1260, 1095 cm^{-1}
NMR ($CDCl_3$, δ) : 2.36 (3H, s), 2.43 (3H, s), 5.23 (2H, s), 6.28-6.63 (2H, m), 7.0-7.53 (5H, m), 7.59 (1H, dd, J = 1.5HZ and 6HZ)
(2) 8-(1-Phenylethoxy)-2-methylimidazo[1,2-a]pyridine
NMR ($CDCl_3$, δ) : 1.80 (3H, d, J = 7Hz), 2.52 (3H, s), 5.50 (1H, q, J = 7Hz), 6.06-6.56 (2H, m), 6.93-7.66 (7H, m)
(3) 8-(3-Chlorobenzyloxy)-2-methylimidazo[1,2-a]pyridine
mp : 108 to 110 °C (recrystallized from a mixture of ethyl acetate and n-hexane)
IR (Nujol) : 1590, 1530, 1490, 1275, 1260, 1160, 1100 cm^{-1}
NMR ($CDCl_3$, δ) : 2.46 (3H, s), 5.26 (2H, s), 6.25-6.75 (2H, m), 7.15-7.45 (4H, m), 7.50 (1H, s), 7.63 (1H, dd, J = 2Hz and 6Hz)
(4) 8-(2-Bromobenzyloxy)-2-methylimidazo[1,2-a]pyridine
mp : 113 to 114 °C (recrystallized from diethyl ether)
NMR ($CDCl_3$, δ) : 2.54 (3H, s), 5.43 (2H, s), 6.29-6.76 (2H, m), 7.10-7.80 (6H, m)
(5) 8-(2,6-Dichlorobenzyloxy)-2-methylimidazo[1,2-a]pyridine
mp : 157 to 160 °C
NMR ($CDCl_3$, δ) : 2.43 (3H, s), 5.45 (2H, s), 6.46-6.76 (2H, m), 7.13-7.46 (4H, m), 7.56-7.76 (1H, m)
(6) 8-(2,4-Dichlorobenzyloxy)-2-methylimidazo[1,2-a]pyridine
mp : 140 to 141 °C (recrystallized from ethyl acetate)
IR (Nujol) : 1280, 1100 cm^{-1}
NMR ($CDCl_3$, δ) : 2.50 (3H, s), 5.36 (2H, s), 6.20-6.73 (2H, m), 7.10-7.80 (5H, m)

Preparation 13

A solution of 2-amino-3-(2-methylbenzylamino)-pyridine (3.25 g) and chloroacetone (1.26 ml) in ethanol (65 ml) was refluxed for 18 hours and then evaporated in vacuo. To the residue was added aqueous sodium bicarbonate solution and the mixture was extracted with methylene chloride. The extract was washed with brine, dried over magnesium sulfate, and evaporated in vacuo. The oily residue was purified by column chromatography on silica gel (40 g) with a mixture of methylene chloride and ethyl acetate (10:1) as an eluent to give 8-(2-methylbenzylamino)-2-methylimidazo[1,2-a]pyridine (1.80 g).
NMR ($CDCl_3$, δ) : 2.38 (3H, s), 2.42 (3H, s), 4.40 (2H, d, J = 6Hz), 5.06-5.46 (1H, broad s), 6.04 (1H, d, J = 7.5Hz), 6.56 (1H, t, J = 7Hz), 7.10-7.56 (6H, m)

Preparation 14

8-(2-Chlorobenzylamino)-2-methylimidazo[1,2-a]pyridine was obtained according to a similar manner to that of Preparation 13.
NMR ($CDCl_3$ δ) : 2.43 (3H, s), 4.56 (2H, d, J = 6Hz), 5.36-5.76 (1H, m), 5.96 (1H, d, J = 7Hz), 6.52 (1H, t, J = 7Hz), 7.06-7.63 (6H, m)

Preparation 15

To a solution of 37% aqueous formaldehyde (2.38 g) in acetic acid (38 ml) was added dropwise 50% aqueous dimethylamine (2.63 g) with ice-cooling over a period of 10 minutes and the mixture was stirred for an additional 10 minutes. The mixture was heated at 50-55 °C for 2 hours after an addition of 8-(2-chlorobenzyloxy)-2-methylimidazo[1,2-a]pyridine (7.6 g) thereto and then evaporated in vacuo. The residue was basified with aqueous sodium hydroxide and extracted with methylene chloride. The extract was washed with water, dried over magnesium sulfate and evaporated in vacuo. The residual solid was recrystallized from a mixture of diethyl ether and n-hexane to give 8-(2-chlorobenzyloxy)-3-dimethylaminomethyl-2-methylimidazo[1,2-a]pyridine (7.85 g).
mp : 100 to 101 °C
IR (Nujol) : 1550, 1295, 1285 cm^{-1}
NMR ($CDCl_3$, δ) : 2.26 (6H, s), 2.50 (3H, s), 3.63 (2H, s), 5.43 (2H, s), 6.30-6.80 (2H, m), 7.10-7.46 (3H, m), 7.50-7.93 (2H, m)

Preparation 16

The following compounds were obtained according to a similar manner to that of Preparation 15.
(1) 8-(2-Methylbenzyloxy)-3-dimethylaminomethyl-2-methylimidazo[1,2-a]pyridine
mp : 65 to 67 °C (recrystallized from petroleum ether)
IR (Nujol) : 1535, 1270, 1085, 1010 cm^{-1}
NMR ($CDCl_3$, δ) : 2.21 (6H, s), 2.40 (3H, s), 2.45 (3H, s), 3.60 (2H, s), 5.26 (2H, s), 6.30-6.77 (2H, m), 7.07-7.56 (4H, m), 7.81 (1H, dd, J = 1.5Hz and 6Hz)
(2) 8-(1-Phenylethoxy)-3-dimethylaminomethyl-2-methylimidazo[1,2-a]pyridine
NMR ($CDCl_3$, δ) : 1.80 (3H, d, J = 7Hz), 2.23 (6H, s), 2.50 (3H, s), 3.60 (2H, s), 5.50 (1H, q, J = 7Hz), 6.25 (1H, dd, J = 1Hz and 6Hz), 6.46 (1H, t, J = 6Hz), 7.16-7.56 (5H, m), 7.71 (1H, dd, J = 1Hz and 6Hz)
(3) 8-(3-Chlorobenzyloxy)-3-dimethylaminomethyl-2-methylimidazo[1,2-a]pyridine
mp : 71 to 72 °C (recrystallized from a mixture of of diethyl ether and n-hexane)
IR (Nujol) : 1540, 1290, 1275 cm^{-1}
NMR ($CDCl_3$, δ) : 2.22 (6H, s), 2.46 (3H, s), 3.63 (2H, s), 5.29 (2H, s), 6.30-6.79 (2H, m), 7.16-7.46 (3H, m), 7.52 (1H, s), 7.83 (1H, dd, J = 2Hz and 6Hz)
(4) 8-(4-Chlorobenzyloxy)-3-dimethylaminomethyl-2-methylimidazo[1,2-a]pyridine
mp : 132 to 134 °C
NMR (DMSO-d_6, δ) : 2.12 (6H, s), 2.30 (3H, s), 3.6 (2H, s), 5.25 (2H, s), 6.60-6.80 (2H, m), 7.45 (4H, s), 7.76-7.96 (1H, m)
(5) 8-(2-Bromobenzyloxy)-3-dimethylaminomethyl-2-methylimidazo[1,2-a]pyridine
mp : 107 to 108 °C (recrystallized from petroleum ether)
NMR ($CDCl_3$, δ) : 2.22 (6H, s), 2.46 (3H, s), 3.60 (2H, s), 5.37 (2H, s), 6.27-6.73 (2H, m), 6.93-7.73 (4H, m), 7.80 (1H, dd, J = 2Hz and 6Hz)
(6) 8-(2,6-Dichlorobenzyloxy)-3-dimethylaminomethyl-2-methylimidazo[1,2-a]pyridine
mp : 141 to 145 °C
NMR ($CDCl_3$, δ) : 2.25 (6H, s), 2.45 (3H, s), 3.63 (2H, s), 5.50 (2H, s), 6.53-6.83 (2H, m), 7.16-7.50 (3H, m), 7.85 (1H, dd, J = 3Hz and 5Hz)
(7) 8-(3,4-Dichlorobenzyloxy)-3-dimethylaminomethyl-2-methylimidazo[1,2-a]pyridine
mp : 96 to 98 °C
NMR ($CDCl_3$, δ) : 2.23 (6H, s), 2.46 (3H, s), 3.60 (2H, s), 5.25 (2H, s), 6.36-6.80 (2H, m), 7.20-7.66 (3H, m), 7.83 (1H, dd, J = 2Hz and 7Hz)
(8) 8-(2,4-Dichlorobenzyloxy)-3-dimethylaminomethyl-2-methylimidazo[1,2-a]pyridine
mp : 90 to 92 °C
NMR ($CDCl_3$, δ) : 2.23 (6H, s), 2.46 (3H, s), 3.63 (2H, s), 5.36 (2H, s), 6.26-6.76 (2H, m), 7.23 (1H, dd, J = 2Hz and 8Hz), 7.40 (1H, d, J = 2Hz), 7.56 (1H, d, J = 8Hz), 7.80 (1H, dd, J = 2Hz and 7Hz)
(9) 8-Benzyloxy-3-dimethylaminomethylimidazo[1,2-a]pyridine
mp : 86 to 87 °C
NMR ($CDCl_3$, δ) : 2.23 (6H, s), 3.66 (2H, s), 5.33 (2H, s), 6.36-6.76 (2H, m), 7.20-7.60 (6H, m), 7.90 (1H, dd, J = 2Hz and 6Hz)
(10) 8-Benzyloxy-3-dimethylaminomethyl-2-phenylimidazo[1,2-a]pyridine
mp : 87 to 89 °C (recrystallized from a mixture of ethyl acetate and n-hexane)
NMR ($CDCl_3$, δ) : 2.23 (6H, s), 3.83 (2H, s), 5.40 (2H, s), 6.30-6.80 (2H, m), 7.20-8.13 (11H, m)
(11) 8-(2-Methylbenzylamino)-3-dimethylaminomethyl-2-methylimidazo[1,2-a]pyridine
NMR ($CDCl_3$, δ) : 2.22 (6H, s), 2.38 (6H, s), 3.58 (2H, s), 4.36 (2H, d, J = 6Hz), 5.0-5.43 (1H, broad s), 6.06 (1H, d, J = 7Hz), 6.59 (1H, t, J = 7Hz), 7.05-7.45 (4H, m), 7.55 (1H, d, J = 7Hz)
(12) 8-(2-Chlorobenzylamino)-3-dimethylaminomethyl-2-methylimidazo[1,2-a[pyridine
NMR ($CDCl_3$, δ) : 2.25 (6H, s), 2.45 (3H, s), 3.62 (2H, s), 4.60 (2H, d, J = 6Hz), 5.40-5.83 (1H, m), 6.03 (1H, d, J = 7Hz), 6.60 (1H, t, J = 7Hz), 7.07-7.56 (4H, m), 7.60 (1H, d, J = 7Hz)

Preparation 17

Methyl iodide (3.48 g) was added dropwise to a solution of 8-(2-chlorobenzyloxy)-3-dimethylaminomethyl-2-methylimidazo[1,2-a]pyridine (7.8 g) in acetone (100 ml) at room temperature and the mixture was stirred for 24 hours. The resulting precipitate was collected by filtration, washed with acetone, and dried in a desiccator to give 8-(2-chlorobenzyloxy)-3-trimethylammoniomethyl-2-methylimidazo[1,2-a]pyridine iodide (11.35 g).
mp : > 165 °C (decomp.)
IR (Nujol) : 1540, 1400, 1360, 1290 cm^{-1}
NMR (DMSO-d_6, δ) : 2.50 (3H, s), 3.20 (9H, s), 5.10 (2H, s), 5.39 (2H, s), 6.98 (2H, broad d, J = 4Hz), 7.30-

7.86 (4H, m), 8.55 (1H, broad-t, J = 4Hz).

Preparation 18

The following compounds were obtained according to a similar manner to that of Preparation 17.

(1) 8-(2-Methylbenzyloxy)-3-trimethylammoniomethyl-2-methylimidazo[1,2-a]pyridine iodide
mp : >175° C (decomp.)
IR (Nujol) : 1545, 1490, 1285, 1270 cm^{-1}
NMR (DMSO-d_6, δ) : 2.38 (3H, s), 2.46 (3H, s), 3.13 (9H, s), 5.02 (2H, s), 5.28 (2H, s), 6.9-7.6 (6H, m), 8.45 (1H, t, J = 3.5Hz)

(2) 8-(1-Phenylethoxy)-3-trimethylammoniomethyl-2-methylimidazo[1,2-a]pyridine iodide
mp : 158° C (decomp.)
NMR (DMSO-d_6, δ) : 1.63 (3H, d, J = 6Hz), 2.49 (3H, s), 3.10 (9H, s), 4.96 (2H, s), 5.78 (1H, q J = 6Hz), 6.53-7.0 (2H, m), 7.11-7.65 (5H, m), 8.35 (1H, broad d, J = 6Hz)

(3) 8-(3-Chlorobenzyloxy)-3-trimethylammoniomethyl-2-methylimidazo[1,2-a]pyridine iodide
mp : >153° C (decomp.)
IR (Nujol) : 1540, 1290, 1080 cm^{-1}
NMR (DMSO-d_6, δ) : 2.49 (3H, s), 3.16 (9H, s), 5.06 (2H, s), 5.39 (2H, s), 6.86-7.1 (2H, m), 7.33-7.73 (4H, m), 8.40-8.63 (1H, m)

(4) 8-(4-Chlorobenzyloxy)-3-trimethylammoniomethyl-2-methylimidazo[1,2-a]pyridine iodide
mp : >180° C (decomp.)
NMR (DMSO-d_6, δ) : 2.52 (2H, s), 3.22 (9H, s), 5.10 (2H, s), 5.33 (2H, s), 6.80-7.10 (2H, m), 7.30-7.70 (4H, m), 8.54 (1H, broad t, J = 3Hz)

(5) 8-(2-Bromobenzyloxy)-3-trimethylammoniomethyl-2-methylimidazo[1,2-a]pyridine iodide
mp : >160° C (decomp.)
NMR (DMSO-d_6, δ) : 2.47 (3H, s), 3.14 (9H, s), 5.01 (2H, s), 5.32 (2H, s), 6.86-7.06 (2H, m), 7.23-7.86 (4H, m), 8.36-8.63 (1H, m)

(6) 8-(2,6-Dichlorobenzyloxy)-3-trimethylammoniomethyl-2-methylimidazo[1,2-a]pyridine iodide
mp : 270 to 275° C (decomp.)
NMR (DMSO-d_6, δ) : 2.40 (3H, s), 3.10 (9H, s), 5.00 (2H, s), 5.40 (2H, s), 6.76-7.20 (2H, m), 7.40-7.70 (3H, m), 8.45 (1H, dd, J = 2Hz and 6Hz)

(7) 8-(3,4-Dichlorobenzyloxy)-3-trimethylammoniomethyl-2-methylimidazo[1,2-a]pyridine iodide
mp : 190° C (decomp.)
NMR (DMSO-d_6, δ) : 2.43 (3H, s), 3.13 (9H, s), 5.00 (2H, s), 5.45 (2H, s), 6.46-6.76 (2H, m), 7.36-7.83 (3H, m), 8.45 (1H, dd, J = 2Hz and 4Hz)

(8) 8-(2,4-Dichlorobenzyloxy)-3-trimethylammoniomethyl-2-methylimidazo[1,2-a]pyridine iodide
mp : 187° C (decomp.)
NMR (DMSO-d_6, δ) : 2.50 (3H, s), 3.20 (9H, s), 5.03 (2H, s), 5.35 (2H, s), 6.86-7.10 (2H, m), 7.50 (1H, dd, J = 2Hz and 8Hz), 7.68 (1H, d, J = 2Hz), 7.75 (1H, d, J = 8Hz), 8.43-8.63 (1H, m)

(9) 8-Benzyloxy-3-trimethylammoniomethylimidazo[1,2-a]pyridine iodide
mp : 202° C (decomp.)
NMR (DMSO-d_6, δ) : 3.16 (9H, s), 5.10 (2H, s), 5.36 (2H, s), 6.70-7.20 (2H, m), 7.26-7.73 (5H, m), 7.86 1H, s), 8.56 (1H, dd, J = 2Hz and 6Hz)

(10) 8-Benzyloxy-3-trimethylammoniomethyl-2-phenylimidazo[1,2-a]pyridine iodide
mp : 159° C (decomp.)
NMR (DMSO-d_6, δ) : 2.90 (9H, s), 5.23 (2H, s), 5.33 (2H, s), 6.90-7.10 (2H, m), 7.23-8.00 (10H, m), 8.56 (1H, dd, J = 3Hz and 5Hz)

(11) 8-(2-Methylbenzylamino)-3-trimethylammoniomethyl-2-methylimidazo[1,2-a]pyridine iodide
mp : 190° C (decomp.)
NMR (DMSO-d_6, δ) : 2.35 (3H, s), ca. 2.4-2.7 (3H, s), 3.12 (9H, s), 4.45 (2H, d, J = 6Hz), 4.85 (2H, s), 6.08 (1H, d, J = 8Hz), 6.35-6.95 (2H, m), 7.06-7.36 (4H, m), 8.03 (1H, d, J = 7Hz)

(12) 8-(2-Chlorobenzylamino)-3-trimethylammoniomethyl-2-methylimidazo[1,2-a]pyridine iodide
mp : >140° C (decomp.)
NMR (DMSO-d_6, δ) : 2.53 (3H, s), 3.16 (9H, s), 4.55 (2H, d, J = 6Hz), 4.98 (2H, s), 6.03 (1H, d, J = 8Hz), 6.56-6.93 (2H, m), 7.10-7.63 (4H, m), 8.11 (1H, d, J = 7Hz)

Example 1

A solution of 2-amino-3-benzyloxypyridine (3 g) and 3-chloro-5-hexen-2-one (2.981 g) in ethanol (15 ml) was stirred and refluxed for 45 hours and then evaporated in vacuo. To the residue was added an aqueous solution of sodium bicarbonate and the mixture was extracted with ethyl acetate. The extract was washed with water, dried over magnesium sulfate and evaporated in vacuo. The oily residue was purified by column chromatography on silica gel (50 g) using methylene chloride and then chloroform as eluents. The eluate with chloroform was evaporated in vacuo and the residual solid was recrystallized from diisopropyl ether to give 8-benzyloxy-3-allyl-2-methylimidazo[1,2-a]pyridine (0.31 g).

mp : 90.5 to 91.5 °C

IR (Nujol) : 1530, 1275 cm^{-1}

NMR ($CDCl_3$, δ) : 2.43 (3H, s), 3.43-3.66 (2H, m), 4.69-5.20 (2H, m), 5.30 (2H, s), ca. 5.4-6.2 (1H, m), 6.23-6.69 (2H, m), 7.13-7.58 (6H, m)

Analysis Calcd. for $C_{18}H_{18}N_2O$:			
Found :	C: 77.67; C: 78.06;	H: 6.52; H: 6.61;	N: 10.06 N: 9.94

Example 2

A solution of 2-amino-3-benzyloxypyridine (2 g) and 3-tosyloxy-5-hexyn-2-one (2.66 g) in ethanol (15 ml) was stirred and refluxed for 24 hours and then evaporated in vacuo. To the residue was added an aqueous solution of sodium bicarbonate and the mixture was extracted with ethyl acetate. The extract was washed with water, dried over magnesium sulfate and evaporated in vacuo. The oily residue was purified by column chromatography on silica gel (50 g) using chloroform as an eluent to give a solid, which was recrystallized from a mixture of methylene chloride and diethyl ether to give 8-benzyloxy-3-(2-propynyl)-2-methylimidazo[1,2-a]pyridine (0.855 g).

mp : 112 to 112.5 °C

IR (Nujol) : 3270, 1570, 1535, 1280, 1265, 1085, 1010 cm^{-1}

NMR ($CDCl_3$, δ) : 2.05 (1H, t, J=3Hz), 2.48 (3H, s), 3.73 (2H, d, J=3Hz), 5.33 (2H, s), 6.31-6.78 (2H, m), 7.20-7.76 (6H, m)

Analysis Calcd. for $C_{18}H_{16}N_2O$:			
Found :	C: 78.24; C: 78.40;	H: 5.84: H: 5.72;	N: 10.14 N: 10.30

Example 3

8-(2-Phenylethoxy)-3-(2-propynyl)-2-methylimidazo[1,2-a]pyridine was obtained by reacting 2-amino-3-(2-phenylethoxy)pyridine with 3-mesyloxy-5-hexyn-2-one according to similar manners to those of Examples 1 and 2.

mp : 114 to 116 °C (recrystallized from a mixture of ethyl acetate and n-hexane)

IR (Nujol) : 3295, 3095, 2100 cm^{-1}

NMR ($CDCl_3$, δ) : 2.07 (1H, t, J=3Hz), 2.49 (3H, s), 3.30 (2H, t, J=8Hz), 3.76 (2H, d, J=3Hz), 4.37 (2H, t, J=8Hz), 6.33-6.86 (2H, m), 7.30 (5H, s), 7.68 (1H, dd, J=1Hz and 7Hz)

Analysis Calcd. for $C_{19}H_{18}N_2O$:			
Found :	C: 78.59; C: 78.43;	H: 6.25; H: 6.11;	N: 9.65 N: 9.98

Example 4

A solution of 2-amino-3-(2-methylbenzyloxy)pyridine (5 g) and 3-tosyloxy-5-hexyn-2-one (7.45 g) in

ethanol (35 ml) was heated under reflux for 28 hours and then evaporated in vacuo. The residue was dissolved in ethyl acetate and the solution was allowed to stand at ambient temperature. The resultant precipitate was collected by filtration and dissolved in a mixture of methylene chloride and aqueous sodium bicarbonate. The organic layer was separated, washed with saturated sodium chloride aqueous solution, treated with silica gel and activated charcoal successively, and evaporated in vacuo.

The crystalline residue was recrystallized from ethyl acetate to give 8-(2-methylbenzyloxy)-3-(2-propynyl)-2-methylimidazo[1,2-a]pyridine (1.44 g).

mp : 138 to 140 °C

IR (Nujol) : 3270, 1570, 1535 cm^{-1}

NMR ($CDCl_3$, δ) : 2.04 (1H, t, J = 3Hz), 2.38 (3H, s), 2.44 (3H, s), 3.75 (2H, d, J = 3Hz), 5.28 (2H, s), 6.45 (1H, dd, J = 1Hz and 8Hz), 6.66 (1H, t, J = 8Hz), 7.06-7.30 (3H, m), 7.37-7.55 (1H, m), 7.70 (1H, dd, J = 1Hz and 8Hz)

Analysis, Calcd. for $C_{19}H_{18}N_2O$:			
Found :	C : 78.59; C : 78.69;	H: 6.25; H: 6.11;	N: 9.65 N: 9.74

Example 5

The following compounds were prepared according to similar manners to those of Examples 1, 2, 3 and 4.

(1) 8-(2-Ethylbenzyloxy)-3-(2-propynyl)-2-methylimidazo[1,2-a]pyridine

mp : 109 to 110 °C (recrystallized from a mixture of ethyl acetate and n-hexane)

IR (Nujol) : 3275 cm^{-1}

NMR ($CDCl_3$, δ) : 1.24 (3H, t, J = 8Hz), 2.03 (1H, t, J = 3Hz), 2.43 (3H, s), 2.76 (2H, q, J = 8Hz), 3.74 (2H, d, J = 3Hz), 5.31 (2H, s), 6.49 (1H, d, J = 7Hz), 6.68 (1H, t, J = 7Hz), 7.13-7.43 (3H, m), 7.49-7.66 (1H, m), 7.81 (1H, d, J = 7Hz)

Analysis Calcd. for $C_{20}H_{20}N_2O$:			
Found :	C: 78.92; C: 79.13;	H: 6.62; H: 6.39;	N: 9.20 N: 9.23

(2) 8-(2-Isopropylbenzyloxy)-3-(2-propynyl)-2-methylimidazo[1,2-a]pyridine

mp : 108 to 109 °C (recrystallized from a mixture of ethyl acetate and n-hexane)

IR (Nujol) : 3280 cm^{-1}

NMR ($CDCl_3$, δ) : 1.26 (6H, d, J = 7Hz), 2.03 (1H, t, J = 3Hz), 2.43 (3H, s), 3.32 (1H, septet, J = 7Hz), 3.74 (2H, d, J = 3Hz), 5.36 (2H, s), 6.45 (1H, d, J = 7Hz), 6.66 (1H, t, J = 7Hz), 7.00-7.53 (4H, m), 7.69 (1H, d, J = 7Hz)

Analysis, Calcd. for $C_{21}H_{22}N_2O$:			
Found :	C: 79.21; C: 79.32;	H: 6.96; H: 7.38;	N: 8.80 N: 8.68

(3) 8-(2-Chlorobenzyloxy)-3-(2-propynyl)-2-methylimidazo[1,2-a]pyridine

mp : 130 to 131 °C (recrystallized from ethyl acetate)

IR (Nujol) : 3265, 1560, 1525 cm^{-1}

NMR ($CDCl_3$, δ) : 2.05 (1H, t, J = 3Hz), 2.46 (3H, s), 3.76 (2H, d, J = 3Hz), 5.42 (2H, s), 6.42 (1H, d, J = 7Hz), 6.66 (1H, t, J = 7Hz), 7.15-7.50 (3H, m), 7.53-7.70 (1H, m), 7.72 (1H, d, J = 7Hz)

Analysis, Calcd. for $C_{18}H_{15}ClN_2O$:			
Found :	C: 69.57; C: 69.58;	H: 4.86; H: 5.13;	N: 9.01 N: 9.06

(4) 8-(3-Chlorobenzyloxy)-3-(2-propynyl)-2-methylimidazo[1,2-a]pyridine.
mp : 110 to 111 °C (recrystallized from a mixture of ethyl acetate and n-hexane)
IR (Nujol) : 3200, 1542 cm^{-1}
NMR ($CDCl_3$, δ) : 2.04 (1H, t, J=3Hz), 2.46 (3H, s), 3.76 (2H, d, J=3Hz), 5.29 (2H, s), 6.43 (1H, d, J=7Hz), 6.66 (1H, t, J=7Hz), 7.18-7.40 (3H, m), 7.49 (1H, s), 7.71 (1H, d, J=7Hz)

Analysis Calcd. for $C_{18}H_{15}ClN_2O$:			
Found :	C: 69.57; C: 69.86;	H: 4.86; H: 4.79;	N: 9.11 N: 9.11

(5) 8-(4-Chlorobenzyloxy)-3-(2-propynyl)-2-methylimidazo[1,2-a]pyridine
mp : 173 to 175 °C (recrystallized from ethyl acetate)
IR (Nujol) : 3295 cm^{-1}
NMR ($CDCl_3$, δ) : 2.05 (1H, t, J=3Hz), 2.48 (3H, s), 3.76 (2H, d, J=3Hz), 5.30 (2H, s), 6.32-6.83 (2H, m), 7.19-7.56 (4H, m), 7.72 (1H, dd, J=2Hz, 6Hz)

Analysis Calcd. for $C_{18}H_{15}ClN_2O$:			
Found :	C: 69.57; C: 69.45;	H: 4.86; H: 4.55;	N: 9.01 N: 9.18

(6) 8-(2-Bromobenzyloxy)-3-(2-propynyl)-2-methylimidazo[1,2-a]pyridine
mp : 156 to 157 °C (recrystallized from ethyl acetate)
IR (Nujol) : 3150, 2100, 1535 cm^{-1}
NMR ($CDCl_3$, δ) : 2.0-2.17 (1H, m), 2.46 (3H, s), 3.76 (2H, d, J=3Hz), 5.38 (2H, s), 6.40 (1H, d, J=7.5Hz), 6.65 (1H, t, J=7.5Hz), 7.03-7.40 (2H, m), 7.50-7.80 (3H, m)

Analysis Calcd. for $C_{18}H_{15}BrN_2O$:			
Found :	C: 60.86; C: 61.01;	H: 4.26; H: 4.45;	N: 7.89 N: 7.84

(7) 8-(2-Fluorobenzyloxy)-3-(2-propynyl)-2-methylimidazo[1,2-a]pyridine
mp : 123 to 125 °C (recrystallized from a mixture of ethyl acetate and n-hexane)
IR (Nujol) : 3300, 3275 cm^{-1}
NMR ($CDCl_3$, δ) : 2.06 (1H, t, J=3Hz), 2.49 (3H, s), 3.77 (2H, d, J=3Hz), 5.40 (2H, s), 6.52 (1H, d, J=7Hz), 6.69 (1H, t, J=7Hz), 6.92-7.63 (4H, m), 7.73 (1H, d, J=7Hz)

Analysis, Calcd. for $C_{18}H_{15}FN_2O$:			
Found :	C: 73.45; C: 73.72;	H: 5.14; H: 5.02;	N: 9.52 N: 9.45

(8) 8-(2,6-Dimethylbenzyloxy)-3-(2-propynyl)-2-methylimidazo[1,2-a]pyridine
mp : 165 to 168 °C (recrystallized from a mixture of ethanol and n-hexane)
IR (Nujol) : 3185 cm^{-1}
NMR ($CDCl_3$, δ) : 2.06 (1H, t, J=3Hz), 2.39 and 2.40 (each s, total 9H), 3.76 (2H, d, J=3Hz), 5.23 (2H, s), 6.53-6.87 (2H, m), 6.94-7.28 (3H, m), 7.73 (1H, dd, J=2Hz and 7Hz)

Analysis Calcd. for $C_{20}H_{20}N_2O$:			
Found :	C: 78.92; C: 78.95;	H: 6.62; H: 6.38;	N: 9.20 N: 9.06

(9) 8-(2,6-Dichlorobenzyloxy)-3-(2-propynyl)-2-methylimidazo[1,2-a]pyridine
mp : 183 to 184 °C (decomp.) (recrystallized from a mixture of methylene chloride and diisopropyl ether)
IR (Nujol) : 3180, 1540 cm^{-1}
NMR ($CDCl_3$, δ) : 2.06 (1H, t, J = 3Hz), 2.43 (3H, s), 3.75 (2H, d, J = 3Hz), 5.47 (2H, s), 6.57-6.89 (2H, m), 7.17-7.43 (3H, m) 7.76 (1H, dd, J = 2Hz and 7Hz)

Analysis Calcd. for $C_{18}H_{14}Cl_2N_2O$:			
Found :	C: 62.62; C: 63.14;	H: 4.09; H: 4.29;	N: 8.11 N: 8.17

(10) 8-(2-Naphthylmethoxy)-3-(2-propynyl)-2-methylimidazo[1,2-a]pyridine
mp : 138 to 139 °C (recrystallized from a mixture of ethyl acetate and n-hexane)
IR (Nujol) : 3290 cm^{-1}
NMR ($CDCl_3$, δ) : 2.04 (1H, t, J = 3Hz), 2.50 (3H, s), 3.74 (2H, d, J = 3Hz), 5.50 (2H, s), 6.33-6.78 (2H, m), 7.23-8.01 (8H, m)
(11) 8-(1-Naphthylmethoxy)-3-(2-propynyl)-2-methylimidazo[1,2-a]pyridine
mp : 138 to 139 °C (recrystallized from a mixture of ethyl acetate and n-hexane)
IR (Nujol) : 3175, 2100 cm^{-1}
NMR ($CDCl_3$, δ) : 2.05 (1H, t, J = 3Hz), 2.46 (3H, s), 3.75 (2H, d, J = 3Hz), 5.80 (2H, s), 6.42-6.82 (2H, m), 7.22-8.26 (8H, m)

Analysis Calcd. for $C_{22}H_{18}N_2O$:			
Found :	C: 80.96; C: 80.86;	H: 5.56; H: 5.62;	N: 8.58 N: 8.86

(12) 8-(1,2,3,4-Tetrahydro-1-naphthyloxy)-3-(2-propynyl)-2-methylimidazo[1,2-a]pyridine
mp : 139 to 141 °C (recrystallized from a mixture of ethanol and n-hexane)
IR (Nujol) : 3180 cm^{-1}
NMR ($CDCl_3$, δ) : 1.67-2.34 (5H, m), 2.44 (3H, s), 2.83-2.97 (2H, m), 3.78 (2H, d, J = 3Hz), 5.79 (1H, broad t, J = 4Hz), 6.57-6.89 (2H, m), 7.01-7.30 (3H, m), 7.36-7.54 (1H, m), 7.74 (1H, dd, J = 2Hz and 7Hz)

Analysis Calcd. for $C_{21}H_{20}N_2O \cdot 1/2H_2O$:			
Found :	C: 77.51; C: 78.08;	H: 6.50; H: 6.46;	N: 8.61 N: 8.66

(13) 8-(Cinnamyloxy)-3-(2-propynyl)-2-methylimidazo[1,2-a]pyridine (trans isomer)
mp : 130 to 131 °C (recrystallized from a mixture of ethyl acetate and n-hexane)
IR (Nujol) : 3280 cm^{-1}
NMR ($CDCl_3$, δ) : 2.04 (1H, t, J = 3Hz), 2.44 (3H, s), 3.75 (2H, d, J = 3Hz), 4.91 (2H, d, J = 5Hz), 6.28-6.90 (4H, m), 7.14-7.44 (5H, m), 7.71 (1H, d, J = 7.5Hz)

Analysis Calcd. for $C_{20}H_{18}N_2O$:			
Found :	C: 79.44; C: 79.26;	H: 6.00; H: 6.10;	N: 9.26 N: 9.24

(14) 8-Cyclohexylmethoxy-3-(2-propynyl)-2-methylimidazo[1,2-a]pyridine

mp : 118 to 119.5 °C (recrystallized from a mixture of ethyl acetate and n-hexane)
IR (Nujol) : 3200, 2100 cm^{-1}
NMR ($CDCl_3$, δ) : 0.83-2.26 (11H, m), 2.03 (1H, t, J = 3Hz), 2.46 (3H, s), 3.80 (2H, d, J = 3Hz), 3.98 (2H, d, J = 6Hz), 6.48 (1H, d, J = 7Hz), 6.73 (1H, t, J = 7Hz), 7.71 (1H, dd, J = 1Hz and 7Hz)

Analysis Calcd. for $C_{18}H_{22}N_2O$:			
Found :	C: 76.56; C: 77.05;	H: 7.85; H: 7.54;	N: 9.92 N: 9.80

(15) 8-Ethoxy-3-(2-propynyl)-2-methylimidazo[1,2-a]pyridine
mp : 163 to 165 °C (recrystallized from a mixture of ethyl acetate and n-hexane)
IR (Nujol) : 3190, 2100 cm^{-1}
NMR ($CDCl_3$, δ) : 1.53 (3H, t, J = 7Hz), 2.03 (1H, t, J = 3Hz), 2.44 (3H, s), 3.73 (2H, d, J = 3Hz), 4.20 (2H, q, J = 7Hz), 6.40 (1H, d, J = 7Hz), 6.66 (1H, t, J = 7Hz), 7.65 (1H, dd, J = 1Hz and 7Hz)

Analysis Calcd. for $C_{13}H_{14}N_2O$:			
Found :	C: 72.87; C: 73.04;	H: 6.59; H: 6.48;	N: 13.07 N: 13.26

(16) 8-(2-Methylbenzyloxy)-3-(1,2-propadienyl)-2-methylimidazo[1,2-a]pyridine
mp : 88 to 89 °C (recrystallized from a mixture of diethyl ether and petroleum ether)
IR (Nujol) : 1930 cm^{-1}
(17) 8-Benzyloxy-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine hydrochloride
mp : 167 to 169 °C
IR (Nujol) : 3180, 2560 (broad), 2125, 1675, 1580, 1090 cm^{-1}
(18) 8-Benzyloxy-3-(2-propynyloxymethyl)-2-methylimidazo-[1,2-a]pyridine
mp : 103 to 104 °C
IR (Nujol) : 3250, 2125, 1545, 1470, 1075 cm^{-1}
(19) 8-(1-Phenylethoxy)-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine
IR (film/NaCl) : 2100 cm^{-1}
(20) 8-(2-Methylbenzyloxy)-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine
mp : 87 to 89 °C
IR (Nujol) : 3225, 2125, 1530, 1060, 1050 cm^{-1}
(21) 8-(2-Chlorobenzyloxy)-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine
mp : 95 to 95.5 °C
IR (Nujol) : 3280, 2120, 1575, 1545, 1295, 1070 cm^{-1}
(22) 8-(3-Chlorobenzyloxy)-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine
mp : 81 to 83 °C (recrystallized from petroleum ether)
IR (Nujol) : 3130, 2095, 1570, 1540, 1285, 1055 cm^{-1}
(23) 8-(4-Chlorobenzyloxy)-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine
mp : 130 to 131 °C (recrystallized from a mixture of ethyl acetate and n-hexane)
IR (Nujol) : 3240, 2100, 1530, 1490, 1360, 1275, 1265 cm^{-1}
(24) 8-(2-Bromobenzyloxy)-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine
mp : 103 to 104 °C (recrystallized from a mixture of methylene chloride and diethyl ether)
(25) 8-(2,6-Dichlorobenzyloxy)-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine
mp : 129 to 130 °C (recrystallized from a mixture of ethyl acetate and n-hexane)
IR (Nujol) : 3290 cm^{-1}
(26) 8-(3,4-Dichlorobenzyloxy)-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine
mp : 105 to 107 °C (recrystallized from a mixture of ethyl acetate and n-hexane)
IR (Nujol) : 3260, 2110, 1280, 1160 cm^{-1}
(27) 8-(2,4-Dichlorobenzyloxy)-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine
mp : 123 to 124 °C (recrystallized from a mixture of ethyl acetate and n-hexane)
IR (Nujol) : 3250, 2110, 1280, 1060 cm^{-1}
(28) 8-Benzyloxy-3-(2-propynyloxymethyl)imidazo[1,2-a]pyridine
mp : 84 to 85 °C (recrystallized from diisopropyl ether)

IR (Nujol) : 3170, 2100 cm^{-1}
(29) 8-Benzyloxy-3-(2-propynyloxymethyl)-2-phenylimidazo[1,2-a]pyridine
NMR ($CDCl_3$, δ) : 2.40 (1H, t, J = 1Hz), 4.20 (2H, d, J = 1Hz), 4.96 (2H, s), 5.33 (2H, s), 6.40-6.80 (2H, m), 7.20-7.70 (8H, m), 7.76-7.96 (3H, m)
(30) 8-(2-Methylbenzylamino)-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine hydrochloride
mp : 159 to 161 °C (recrystallized from a mixture of ethanol and n-hexane)
(31) 8-(2-Chlorobenzylamino)-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine hydrochloride
mp : 169 °C (decomp.) (recrystallized from a mixture of ethanol and diethyl ether)
(32) 8-Benzyloxy-3-allyloxymethyl-2-methylimidazo[1,2-a]pyridine
mp : 70 to 71 °C
IR (Nujol) : 1535, 1280, 1265, 1195, 1100, 1050, 1015 cm^{-1}
(33) 8-Benzyloxy-3-(3-carboxy-2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine
mp : 151 °C (decomp.)
(34) 8-Benzyloxy-3-(3-ethoxycarbonyl-2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine
NMR ($CDCl_3$, δ) : 1.33 (3H, t, J = 5Hz), 2.53 (3H, s), 4.20 (2H, s), 4.27 (2H, q, J = 5Hz), 4.90 (2H, s), 5.30 (2H, s), 6.50 (1H, dd, J = 1Hz and 5Hz), 6.65 (1H, t, J = 5Hz), 7.26-7.60 (5H, m), 7.75 (1H, dd, J = 1Hz and 5Hz)

Example 6

A solution of 2-amino-3-(2-methylbenzylamino)pyridine (2 g) and 3-mesyloxy-5-hexyn-2-one (1.78 g) in ethanol (40 ml) was refluxed for 31.5 hours and then evaporated in vacuo. The residue was treated with aqueous sodium bicarbonate solution and extracted with methylene chloride. The extract was washed with water, dried over magnesium sulfate, and evaporated in vacuo. The residue was purified by column chromatography on silica gel (40 g) with a mixture of methylene chloride and ethyl acetate (50:1 to 10:1) as an eluent to give 8-(2-methylbenzylamino)-3-(2-propynyl)-2-methylimidazo[1,2-a]pyridine (0.82 g).
mp : 126 to 128 °C (recrystallized from diisopropyl ether)
NMR ($CDCl_3$, δ) : 2.04 (1H, t, J = 3Hz), 2.38 (3H, s), 2.40 (3H, s), 3.73 (2H, d, J = 3Hz), 4.39 (2H, d, J = 5Hz), 5.13-5.43 (1H, broad s), 6.08 (1H, d, J = 8Hz), 6.66 (1H, t, J = 7Hz), 7.0-7.43 (4H, m), 7.45 (1H, d, J = 6Hz)

Example 7

8-(2-Chlorobenzylamino)-3-(2-propynyl)-2-methylimidazo[1,2-a]pyridine was obtained according to a similar manner to that of Example 6.
mp : 115 to 116.5 °C (recrystallized from a mixture of ethyl acetate and n-hexane)
NMR ($CDCl_3$, δ) : 2.03 (1H, t, J = 3Hz), 2.40 (3H, s), 3.68 (2H, d, J = 3Hz), 4.52 (2H, d, J = 6Hz), 5.55 (1H, broad t, J = 6Hz), 5.95 (1H, d, J = 7Hz), 6.55 (1H, t, J = 7Hz), 6.96-7.55 (5H, m)

Analysis Calcd. for $C_{18}H_{16}ClN_3$:			
Found :	C: 69.79; C: 69.97;	H: 5.21; H: 5.48;	N: 13.56 N: 13.62

Example 8

Sodium bicarbonate (2.73 g) was added to a solution of 2-amino-3-(2-methylbenzyloxy)pyrazine (3.5 g) and 3-mesyloxy-5-hexyn-2-one (6.18 g) in ethanol (35 ml) and the mixture was refluxed for 12 hours. The mixture was poured into an aqueous solution of sodium bicarbonate and extracted with chloroform. The extract was washed with water, dried over magnesium sulfate, and evaporated in vacuo. The residue was purified by column chromatography on silica gel (200 g) with a mixture of chloroform and methanol (50:1) as an eluent to give 8-(2-methylbenzyloxy)-3-(2-propynyl)-2-methylimidazo[1,2-a]pyrazine (0.182 g).
mp : 123 to 124 °C
NMR ($CDCl_3$, δ) : 2.08 (1H, t, J = 3Hz), 2.42 (3H, s), 2.45 (3H, s), 3.72 (2H, d, J = 3Hz), 5.55 (2H, s), 7.00-7.55 (4H, m), 7.35 (1H, d, J = 5Hz), 7.63 (1H, d, J = 5Hz)

Example 9

8-(2-Methylbenzylamino)-3-(2-propynyl)-2-methylimidazo[1,2-a]pyrazine hydrochloride was obtained according to a similar manner to that of Example 8.
mp : 184 to 186° C (decomp.)

Analysis Calcd. for $C_{18}H_{18}N_4 \cdot HCl$:				
Found :	C: 66.19; C: 66.15;	H: 5.95; H: 5.86;	N: 17.38; N: 17.14;	Cl: 10.90 Cl: 10.52

IR (Nujol) : 3350, 3180, 2560, 1660, 1635, 1525 cm^{-1}
NMR (DMSO-d_6, δ) : 2.37 (3H, s), ca. 2.3-2.7 (3H, s), 3.13 (1H, t, J=3Hz), 4.08 (2H, d, J=3Hz), 4.90 (2H, d, J=6Hz), 7.00-7.50 (4H, m), 7.42 (1H, d, J=5Hz), 7.92 (1H, d, J=5Hz), 9.70-10.2 (1H, broad)

Example 10

A solution of 8-(2-methylbenzyloxy)-3-(2-propynyl)-2-methylimidazo[1,2-a]pyridine (0.99 g) and 1N-sodium hydroxide solution (5.65 ml) in methanol (50 ml) was stirred for 72 hours at room temperature. The mixture was evaporated in vacuo and the residue was dissolved in chloroform. The solution was washed with brine, dried over magnesium sulfate, and evaporated in vacuo. The residue was purified by column chromatography on silica gel (14 g) with a mixture of chloroform and ethyl acetate (15:1) as an eluent to give 8-(2-methylbenzyloxy)-3-(1,2-propadienyl)-2-methylimidazo[1,2-a]pyridine (0.27 g).
mp : 88 to 89° C (recrystallized from a mixture of diethyl ether and petroleum ether).
IR (Nujol) : 1930 cm^{-1}
NMR ($CDCl_3$, δ) : 2.40 (3H, s), 2.46 (3H, s), 5.26 (2H, s), 5.26-5.43 (2H, m), 6.40-6.76 (3H, m), 7.06-7.30 (3H, m), 7.33-7.53 (1H, m), 8.10 (1H, dd, J=1Hz and 7Hz)

Analysis Calcd. for $C_{19}H_{18}N_2O$:			
Found :	C: 78.59; C: 78.86;	H: 6.25; H: 6.02;	N: 9.65 N: 9.57

Example 11

To a solution of sodium hydride (61% in mineral oil dispersion) (7.39 g) in 2-propynyl alcohol (300 ml) was added 8-benzyloxy-3-trimethylammoniomethyl-2-methylimidazo[1,2-a]pyridine iodide (74.6 g), and the mixture was heated at 90-95° C with stirring for 2.5 hours. After being cooled, the mixture was evaporated in vacuo and the residue was dissolved in methylene chloride. The solution was washed with water, dried over magnesium sulfate, and evaporated in vacuo. The oily residue was purified by column chromatography on Silica gel (200 g) with methylene chloride as an eluent and the fractions containing the object compound were combined. The resultant solution was treated with a solution of hydrogen chloride in ethanol to give 8-benzyloxy-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine hydrochloride (37.5 g).
mp : 167 to 169° C
IR (Nujol) : 3180, 2560(broad), 2125, 1675, 1580, 1090 cm^{-1}
NMR (D_2O, δ) : 2.56 (3H, s), 3.03 (1H, t, J=2Hz), 4.31 (2H, d, J=2Hz), 4.96 (2H, s), 5.29 (2H, s), 7.13-7.56 (7H, m), 8.01-8.14 (1H, m)

Analysis Calcd. for $C_{19}H_{19}ClN_2O_2$:			
Found :	C: 66.57; C: 66.37;	H: 5.59; H: 5.33;	N: 8.17 N: 8.06

Example 12

A solution of 8-benzyloxy-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine hydrochloride (35.5 g) in hot water (700 ml) was neutralized with aqueous sodium hydroxide solution and extracted with

methylene chloride. The extract was washed with water, dried over magnesium sulfate, treated with activated charcoal, and evaporated in vacuo. The residual solid was recrystallized from a mixture of methylene chloride and n-hexane to give 8-benzyloxy-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]-pyridine (26.03 g).

mp : 103 to 104 °C

IR (Nujol) : 3250, 2125, 1545, 1470, 1075 cm^{-1}

NMR ($CDCl_3$, δ) : 2.43-2.60 (1H, m), 2.53 (3H, s), 4.07 (2H, d, J = 2Hz), 4.87 (2H, s), 5.33 (2H, s), 6.33-6.76 (2H, m), 7.20-7.60 (5H, m), 7.73 (1H, dd, J = 2Hz and 6Hz)

Example 13

To a solution of sodium hydride (63.6% in mineral oil dispersion, 0.285 g) in 2-propynyl alcohol (12 ml) was added 8-(2-methylbenzyloxy)-3-trimethylammoniomethyl-2-methylimidazo[1,2-a]pyridine iodide (3 g) and the mixture was heated at 85-100 °C for 1.5 hours. After being cooled, the mixture was poured into ice-water and the resulting precipitate was collected by filtration and dissolved in methylene chloride. The solution was treated successively with silica gel (4.5 g) and activated charcoal and evaporated in vacuo. The crystalline residue was recrystallized from a mixture of ethyl acetate and petroleum ether to give 8-(2-methylbenzyloxy)-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine (1.18 g).

mp : 87 to 89 °C

IR (Nujol) : 3225, 2125, 1530, 1060, 1050 cm^{-1}

NMR ($CDCl_3$, δ) : ca. 2.3-2.6 (1H), 2.40 (3H, s), 2.50 (3H, s), 4.06 (2H, d, J = 2Hz), 4.86 (2H, s), 5.29 (2H, s), 6.32-6.8 (2H, m), 7.0-7.56 (4H, m), 7.75 (1H, dd, J = 2Hz, 5Hz),

Analysis Calcd. for $C_{20}H_{20}N_2O_2$:			
Found :	C: 74.98; C: 74.98;	H: 6.29; H: 6.05;	N: 8.74 N: 8.71

Example 14

To a solution of sodium hydride (60% in mineral oil dispersion, 0.186 g) in 2-propynyl alcohol (8 ml) was added 8-(2-chlorobenzyloxy)-3-trimethylammoniomethyl-2-methylimidazo[1,2-a]pyridine iodide (2 g) and the mixture was heated at 90-95 °C with stirring for 1 hour. After being cooled, the mixture was poured into ice-water and the resulting precipitate was collected by filtration and dissolved in methylene chloride. The solution was treated successively with silica gel (1 g) and activated charcoal and evaporated in vacuo. The crystalline residue was recrystallized from a mixture of methylene chloride and n-hexane to give 8-(2-chlorobenzyloxy)-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine (0.9 g).

mp : 95 to 95.5 °C

IR (Nujol) : 3280, 2120, 1575, 1545, 1295, 1070 cm^{-1}

NMR ($CDCl_3$, δ) : ca. 2.4-2.7 (1H), 2.58 (3H, s), 4.13 (2H, d, J = 2Hz), 4.94 (2H, s), 5.47 (2H, s), 6.39-6.85 (2H, m), 7.10-7.50 (3H, m), 7.50-7.92 (2H, m)

Analysis Calcd. for $C_{19}H_{17}ClN_2O_2$:			
Found :	C: 66.96; C: 67.13;	H: 5.03; H: 4.93;	N: 8.22 N: 8.12

Example 15

The following compounds were obtained according to similar manners to those of Examples 11, 13 and 14.

(1) 8-(1-Phenylethoxy)-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine

IR (film/NaCl) : 2100 cm^{-1}

NMR ($CDCl_3$, δ) : 1.80 (3H, d, J = 6Hz), 2.40-2.60 (1H, m), 2.53 (3H, s), 4.05 (2H, d, J = 2Hz), 4.85 (2H, s), 5.52 (1H, q, J = 6Hz), 6.16-6.69 (2H, m), 7.11-7.56 (5H, m), 7.64 (1H, dd, J = 1Hz and 6Hz)

(2) 8-(3-Chlorobenzyloxy)-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine
mp : 81 to 83 °C (recrystallized from petroleum ether)
IR (Nujol) : 3130, 2095, 1570, 1540, 1285, 1055 cm^{-1}
NMR ($CDCl_3$, δ) : 2.43-2.60 (1H, m), 4.52 (3H, s), 4.08 (2H, d, J=2Hz), 4.88 (2H, s), 5.29 (2H, s), 6.32-6.80 (2H, m), 7.10-7.60 (4H, m), 7.75 (1H, dd, J=2Hz and 7Hz)

Analysis Calcd. for $C_{19}H_{17}ClN_2O_2$:			
Found	C: 66.96; C: 67.23;	H: 5.03; H: 4.88;	N: 8.22 N: 8.15

(3) 8-(4-Chlorobenzyloxy)-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine
mp : 130 to 131 °C (recrystallized from a mixture of ethyl acetate and n-hexane)
IR (Nujol) : 3240, 2100, 1530, 1490, 1360, 1275, 1265 cm^{-1}
NMR ($CDCl_3$, δ) : 2.38-2.58 (1H, m), 2.52 (3H, s), 4.06 (2H, d, J=2Hz), 4.86 (2H, s), 5.26 (2H, s), 6.26-6.73 (2H, m), 7.13-7.56 (4H, m), 7.76 (1H, dd, J=2Hz and 7Hz)

Analysis Calcd. for $C_{19}H_{17}ClN_2O_2$:			
Found :	C: 66.96; C: 66.91;	H: 5.03; H: 4.95;	N: 8.22 N: 8.08

(4) 8-(2-Bromobenzyloxy)-3-(2-propynyloxymethyl-2-methylimidazo[1,2-a]pyridine
mp : 103 to 104 °C (recrystallized from a mixture of methylene chloride and diethyl ether)
NMR ($CDCl_3$, δ) : 2.43-2.63 (1H, m), 2.52 (3H, s), 4.08 (2H, d, J=2Hz), 4.88 (2H, s), 5.39 (2H, s), 6.33-6.81 (2H, n), 7.06-7.73 (4H, m), 7.75 (1H, dd, J=2Hz and 7Hz)
(5) 8-(2,6-Dichlorobenzyloxy)-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine
mp : 129 to 130 °C (recrystallized from a mixture of ethyl acetate and n-hexane)
IR (Nujol) : 3290 cm^{-1}
NMR ($CDCl_3$, δ) : 2.45-2.60 (1H, m), 2.46 (3H, s), 4.06 (2H, d, J=2Hz), 4.86 (2H, s), 5.43 (2H, s), 6.60-6.85 (2H, m), 7.06-7.45 (3H, m), 7.80 (1H, dd, J=2Hz and 3Hz)

Analysis Calcd. for $C_{19}H_{16}Cl_2N_2O_2$:			
Found :	C: 60.81; C: 61.31;	H: 4.30; H: 4.33;	N: 7.47 N: 7.48

(6) 8-(3,4-Dichlorobenzyloxy)-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine
mp : 105 to 107 °C (recrystallized from a mixture of ethyl acetate and n-hexane)
IR (Nujol) : 3260, 2110, 1280, 1160 cm^{-1}
NMR ($CDCl_3$, δ) : 2.40-2.60 (1H, m), 2.46 (3H, s), 4.05 (2H, d, J=2Hz), 4.83 (2H, s), 5.23 (2H, s), 6.26-6.80 (2H, m), 7.13-7.63 (3H, m), 7.75 (1H, dd, J=1Hz and 7Hz)

Analysis Calcd. for $C_{19}H_{16}Cl_2N_2O_2$:			
Found :	C: 60.81; C: 61.26;	H: 4.30; H: 4.23;	N: 7.47 N: 7.55

(7) 8-(2,4-Dichlorobenzyloxy)-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine
mp : 123 to 124 °C (recrystallized from a mixture of ethyl acetate and n-hexane)
IR (Nujol) : 3250, 2110, 1280, 1060 cm^{-1}
NMR ($CDCl_3$, δ) : 2.40-2.66 (1H, m), 2.50 (3H, s) 4.08 (2H, d, J=2Hz), 4.90 (2H, s), 5.36 (2H, s), 6.30-6.83 (2H, m), 7.20 (1H, dd, J=2Hz and 8Hz), 7.40 (1H, d, J=2Hz), 7.50 (1H, d, J=8Hz), 7.80 (1H, dd, J=1Hz and 7Hz)

Analysis Calcd. for $C_{19}H_{16}Cl_2N_2O_2$:			
Found :	C: 60.81; C: 61.29;	H: 4.30; H: 4.25;	N: 7.47 N: 7.41

(8) 8-Benzyloxy-3-(2-propynyloxymethyl)imidazo[1,2-a]pyridine
mp : 84 to 85 °C (recrystallized from diisopropyl ether)
IR (Nujol) : 3170, 2100 cm^{-1}
NMR ($CDCl_3$, δ) : 2.46 (1H, t, J = 2Hz), 4.13 (2H, d, J = 2Hz), 4.9 (2H, s), 5.33 (2H, s), 6.40-6.90 (2H, m), 7.23-7.60 (5H, m), 7.60 (1H, s), 7.83 (1H, dd, J = 2Hz and 7Hz)

Analysis Calcd. for $C_{18}H_{16}N_2O_2$:			
Found :	C: 73.95; C: 73.74;	H: 5.52; H: 5.30;	N: 9.58 N: 9.47

(9) 8-Benzyloxy-3-(2-propynyloxymethyl)-2-phenylimidazo[1,2-a]pyridine
NMR ($CDCl_3$, δ) : 2.40 (1H, t, J = 1Hz), 4.20 (2H, d, J = 1Hz), 4.96 (2H, s), 5.33 (2H, s), 6.40-6.80 (2H, m), 7.20-7.70 (8H, m), 7.76-7.96 (3H, m)
(10) 8-(2-Methylbenzylamino)-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine hydrochloride
mp : 159 to 161 °C (recrystallized from a mixture of ethanol and n-hexane)
NMR (DMSO-d_6, δ) : 2.39 (3H, s), ca. 2.4-2.7 (3H, s), 3.50 (1H, t, J = 2Hz), 4.39 (2H, d, J = 2Hz), 4.50 (2H, broad d, J = 5HZ), 4.91 (2H, s), 6.73 (1H, d, J = 8HZ), 7.06-7.80 (6H, m), 7.91 (1H, d, J = 6Hz)

Analysis Calcd. for $C_{20}H_{22}ClN_3O$:			
Found :	C: 67.50; C: 67.87;	H: 6.23; H: 6.43;	N: 11.81 N: 11.87

(11) 8-(2-Chlorobenzylamino)-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine hydrochloride
mp : 169 °C (decomp.) (crystallized from a mixture of ethanol and diethyl ether)
NMR (DMSO-d_6, δ) : 2.56 (3H, s), 3.52 (1H, t, J = 2Hz), 4.25 (2H, d, J = 2Hz), 4.85 (2H, broad s), 4.95 (2H, s), 6.73 (1H, d, J = 8Hz), 7.13-8.13 (7H, m)

Analysis Calcd. for $C_{19}H_{19}Cl_2N_3O$:			
Found :	C: 60.65; C: 60.71;	H: 5.09; H: 5.39;	N: 11.17 N: 10.98

(12) 8-Benzyloxy-3-allyloxymethyl-2-methylimidazo[1,2-a]pyridine
mp : 70 to 71 °C
IR (Nujol) : 1535, 1280, 1265, 1195, 1100, 1050, 1015 cm^{-1}
NMR ($CDCl_3$, δ) : 2.50 (3H, s), 3.95 (2H, d, J = 6Hz), 4.76 (2H, s), 5.0-5.5 (2H, m), 5.33 (2H, s), 5.6-6.3 (1H, m), 6.36-6.79 (2H, m), 7.20-7.62 (5H, m), 7.75 (1H, dd, J = 2Hz and 6Hz)

Analysis Calcd. for $C_{19}H_{20}N_2O_2$:			
Found :	C: 74.00;H: C: 74.35;H:	6.54; 6.48;	N: 9.08 N: 9.04

(13) 8-Benzyloxy-3-(3-carboxy-2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine
mp : 151 °C (decomp.)
(14) 8-Benzyloxy-3-(3-ethoxycarbonyl-2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine
NMR ($CDCl_3$, δ) : 1.33 (3H, t, J = 5Hz), 2.53 (3H, s), 4.20 (2H, s), 4.27 (2H, q, J = 5Hz), 4.90 (2H, s), 5.30 (2H, s), 6.50 (1H, dd, J = 1Hz and 5Hz), 6.65 (1H, t, J = 5Hz), 7.26-7.60 (5H, m), 7.75 (1H, dd, J = 1Hz and 5Hz)

Example 16

To a solution of 8-benzyloxy-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine (1 g) in tetrahydrofuran (10 ml) was added dropwise 10% solution of n-butyllithium in n-hexane (2.09 ml) at -60°C under a nitrogen atmosphere. After being stirred for 10 minutes the solution was treated with dry ice (1.4 g), allowed to warm to room temperature, and acidified with diluted acetic acid. The resulting precipitates were collected by filtration, washed with water, and recrystallized from methanol to give 8-benzyloxy-3-(3-carboxy-2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine (0.67 g).
mp : 151°C (decomp.)
NMR (DMSO-d_6, δ) : 2.36 (3H, s), 4.30 (2H, s), 4.85 (2H, s), 5.26 (2H, s), 5.93 (1H, broad s), 6.80-7.03 (2H, m), 7.26-7.63 (5H, m), 7.86-8.10 (1H, m)

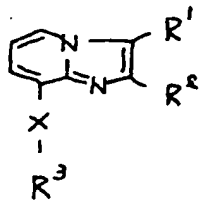
Analysis Calcd. for $C_{20}H_{18}N_2O_4$:			
Found :	C: 65.04; C: 65.07;	H: 5.72; H: 5.54;	N: 7.36 N: 7.35

Example 17

8-Benzyloxy-3-(3-ethoxycarbonyl-2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine was obtained by reacting 8-benzyloxy-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine with ethyl chloroformate according to a similar manner to that of Example 16.
NMR ($CDCl_3$, δ) : 1.33 (3H, t, J = 5Hz), 2.53 (3H, s), 4.20 (2H, s), 4.27 (2H, q, J = 5Hz), 4.90 (2H, s), 5.30 (2H, s), 6.50 (1H, dd, J = 1Hz and 5Hz), 6.65 (1H, t, J = 5Hz), 7.26-7.60 (5H, m), 7.75 (1H, dd, J = 1Hz and 5Hz)

Claims

1. Imidazoheterocyclic compounds of the formula:



wherein
R^1 is (C_2 - C_6) alkenyl, (C_2 - C_6) alkynyl,
(C_3 - C_6) alkadienyl,
(C_2 - C_6) alkenyloxy (C_1 - C_6) alkyl,
(C_2 - C_6) alkynyloxy (C_1 - C_6) alkyl,
carboxy (C_2 - C_6) alkynyloxy (C_1 - C_6) alkyl or
(C_1 - C_6) alkoxycarbonyl (C_2 - C_6) alkynyloxy-(C_1 - C_6) alkyl,
R^2 is hydrogen, (C_1 - C_6) alkyl or aryl selected from a group consisting of phenyl, tolyl, xylyl, 1-naphthyl, 2-naphthyl, 1-anthryl and 2-anthryl,
R^3 is ar (C_1 - C_6) alkyl which has one or more suitable substituent(s) selected from a group consisting of (C_1 - C_6) alkyl and halogen,
ar (C_2 - C_6) alkenyl, benzene-condensed cyclo (C_5 - C_6) alkyl, (C_1 - C_6) alkyl having cyclo (C_3 - C_6) alkyl or (C_1 - C_6) alkyl, and
X is O or NH,
and a pharmaceutically acceptable salt thereof.

2. A compound of claim 1, wherein
R^1 is (C_2 - C_6) alkenyl, (C_2 - C_6) alkynyl, (C_3 - C_6) alkadienyl,
(C_2 - C_6) alkenyloxy (C_1 - C_6) alkyl,

(C_2 - C_6) alkynyloxy (C_1 - C_6) alkyl,
carboxy (C_2 - C_6) alkynyloxy (C_1 - C_6) alkyl or
(C_1 - C_6) alkoxycarbonyl (C_2 - C_6) alkynyloxy (C_1 - C_6) alkyl and

R^3 is ar (C_1 - C_6) alkyl which has one or more suitable substituent(s) selected from a group consisting of (C_1 - C_6) alkyl and halogen, ar (C_2 - C_6) alkenyl, benzene-condensed cyclo (C_5 - C_6) alkyl, (C_1 - C_6) alkyl having cyclo (C_3 - C_6) alkyl or (C_1 - C_6) alkyl.

3. A compound of claim 2, wherein

R^3 is ar (C_1 - C_6) alkyl which has one or more suitable substituent(s) selected from a group consisting of (C_1 - C_6) alkyl and halogen.

4. A compound of claim 3, wherein

R^3 is phenyl (C_1 - C_6) alkyl or naphthyl (C_1 - C_6) alkyl, each of which has 1 to 3 suitable substituent(s) selected from a group consisting of (C_1 - C_6) alkyl and halogen.

5. A compound of claim 4, wherein

R^1 is allyl, 2-propynyl, 1,2-propadienyl, allyloxymethyl, 2-propynyloxymethyl, 3-carboxy-2-propynyloxymethyl or 3-ethoxycarbonyl-2-propynyloxymethyl,

R^2 is hydrogen, methyl or phenyl, and

R^3 is benzyl which has 1 or 2 suitable substituent(s) selected from a group consisting of methyl, ethyl, isopropyl, fluoro, chloro and bromo.

6. A compound of claim 5, which is selected from a group consisting of:
8-(2-methylbenzyloxy)-3-(2-propynyl)-2-methylimidazo[1,2-a]-pyridine,
8-(2-ethylbenzyloxy)-3-(2-propynyl)-2-methylimidazo[1,2-a]-pyridine,
8-(2-isopropylbenzyloxy)-3-(2-propynyl)-2-methylimidazo-[1,2-a]-pyridine,
8-(2-chlorobenzyloxy)-3-(2-propynyl)-2-methylimidazo[1,2-a]-pyridine,
8-(3-chlorobenzyloxy)-3-(2-propynyl)-2-methylimidazo[1,2-a]-pyridine,
8-(4-chlorobenzyloxy)-3-(2-propynyl)-2-methylimidazo[1,2-a]-pyridine,
8-(2-bromobenzyloxy)-3-(2-propynyl)-2-methylimidazo[1,2-a]-pyridine,
8-(2-fluorobenzyloxy)-3-(2-propynyl)-2-methylimidazo-[1,2-a]pyridine,
8-(2,6-dimethylbenzyloxy)-3-(2-propynyl)-2-methylimidazo[1,2-a]pyridine,
8-(2,6-dichlorobenzyloxy)-3-(2-propynyl)-2-methylimidazo[1,2-a]pyridine,
8-(2-methylbenzylamino)-3-(2-propynyl)-2-methylimidazo[1,2a]pyridine,
8-(2-chlorobenzylamino)-3-(2-propynyl)-2-methylimidazo[1,2-a]pyridine,
8-(2-methylbenzyloxy)-3-(1,2-propadienyl)-2-methylimidazo[1,2-a] pyridine,
8-(2-methylbenzyloxy)-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine,
8-(2-chlorobenzyloxy)-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine,
8-(3-chlorobenzyloxy)-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine,
8-(4-chlorobenzyloxy)-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine,
8-(2-bromobenzyloxy)-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine,
8-(2,6-dichlorobenzyloxy)-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine,
8-(3,4-dichlorobenzyloxy)-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine,
8-(2,4-dichlorobenzyloxy)-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine,
8-(2-methylbenzylamino)-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine hydrochloride,
8-(2-chlorobenzylamino-3-(2-propynyloxymethyl)-2-methylimidazo[1,2-a]pyridine hydrochloride.

7. A compound of claim 2, wherein

R^1 is (C_2 - C_6) alkynyl,

R^2 is (C_1 - C_6) alkyl,

R^3 is phenyl (C_2 - C_6) alkenyl, 1,2,3,4-tetrahydronaphthyl, (C_1 - C_6) alkyl having cyclo (C_3 - C_6) alkyl or (C_1 - C_6) alkyl, and

X is O.

8. A compound of claim 7, wherein

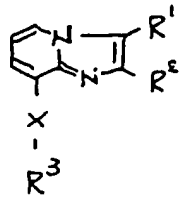
R^1 is 2-propynyl,

R^2 is methyl and

R^3 is cinnamyl, 1,2,3,4-tetrahydro-1-naphthyl, cyclohexylmethyl or ethyl.

9. A compound of claim 8, which is selected from a group consisting of:
8-(cinnamyloxy)-3-(2-propynyl)-2-methylimidazo[1,2-a]pyridine,
8-(1,2,3,4-tetrahydro-1-naphthyloxy)-3-(2-propynyl)-2-methylimidazo[1,2-a]pyridine,
8-cyclohexylmethoxy-3-(2-propynyl)-2-methylimidazo[1,2-a]pyridine, and
8-ethoxy-3-(2-propynyl)-2-methylimidazo[1,2-a]pyridine.

10. A process for preparing imidazoheterocyclic compounds of the formula:



wherein

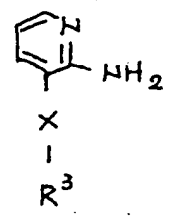
R^1 is (C_2 - C_6) alkenyl, (C_2 - C_6) alkynyl,
(C_3 - C_6) alkadienyl,
(C_2 - C_6) alkenyloxy (C_1 - C_6) alkyl,
(C_2 - C_6) alkynyloxy (C_1 - C_6) alkyl,
carboxy (C_2 - C_6) alkynyloxy (C_1 - C_6) alkyl or (C_1 - C_6) alkoxycarbonyl (C_2 - C_6) alkynyloxy-(C_1 - C_6) alkyl,

R^2 is hydrogen, (C_1 - C_6) alkyl or aryl selected from a group consisting of phenyl, tolyl, xylyl, 1-naphthyl, 2-naphthyl, 1-anthryl and 2-anthryl,

R^3 is ar (C_1 - C_6) alkyl which has one or more suitable substituent(s) selected from a group consisting of (C_1 - C_5) alkyl and halogen,
ar (C_2 - C_6) alkenyl, benzene-condensed cyclo (C_5 - C_6) alkyl, (C_1 - C_6) alkyl having cyclo (C_3 - C_6) alkyl or (C_1 - C_6) alkyl; and

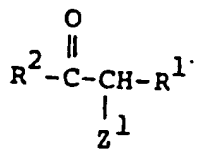
X is O or NH

or a salt thereof, which comprises reacting a compound of the formula:



wherein

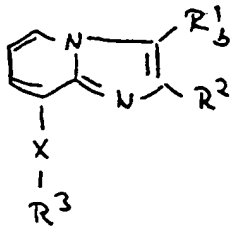
R^3 and X are each as defined above, or a salt thereof, with a compound of the formula:



wherein

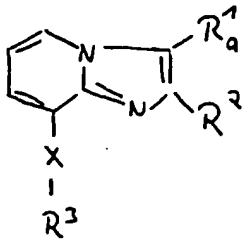
R^1 and R^2 are each as defined above, and Z^1 is an acid residue selected from a group consisting of halogen and acyloxy, or a salt thereof.

11. A process for preparing imidazoheterocyclic compounds of the formula:



wherein

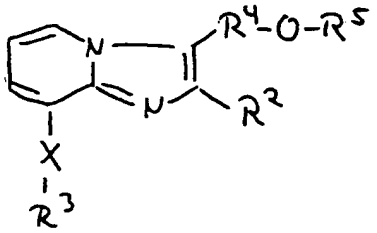
R^2, R^3 and X are each as defined in claim 10, and R^1_b is cumulated (C_3- C_6) alkadienyl, or a salt thereof, which comprises subjecting a compound of the formula:



wherein

R^2, R^3 and X are each as defined in claim 10, and R^1_a is (C_2 - C_6) alkynyl, or a salt thereof, to isomerization reaction.

12. A process for preparing imidazoheterocyclic compounds of the formula:

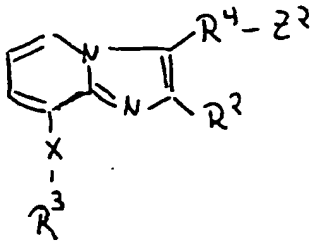


wherein

R^2, R^3 and X are each as defined in claim 10,

R^4 is (C_2 - C_6) alkylene, and

R^5 is (C_2 - C_6) alkenyl, (C_2 - C_6) alkynyl, carboxy (C_2 - C_6) alkynyl or (C_1 - C_6) alkoxycarbonyl-(C_2 - C_6) alkynyl, or a salt thereof, which comprises reacting a compound of the formula:



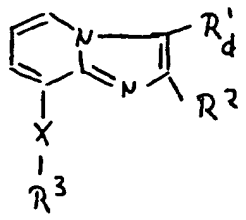
wherein

R^2, R^3, R^4 and X are each as defined above,
Z^2 is a leaving group,
or a salt thereof, with a compound of the formula:

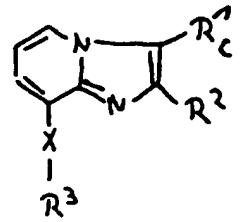
R^5 -OH

wherein
R^5 is as defined above,
or a salt thereof.

13. A process for preparing imidazoheterocyclic compounds of the formula:



wherein
R^2, R^3 and X each as defined in claim 10,
R'_d is carboxy (C_2 - C_6) alkynyloxy (C_1 - C_6) alkyl, in which the triple bond always exists on the terminal carbon atom of the (C_2 - C_6) alkyl moiety and this (C_2 - C_6) alkynyloxy-(C_1 - C_6) alkyl is substituted with carboxy on the terminal carbon atom of the (C_2 - C_6) alkynyl moiety, or (C_1 - C_6) alkoxycarbonyl (C_2 - C_6) alkynyloxy (C_1 - C_6) alkyl, in which the triple bond always exists on the terminal carbon atom of the (C_2 - C_6) alkynyl moiety and this (C_2 - C_6) alkynyloxy (C_1 - C_6) alkyl is substituted with (C_1 - C_6) alkoxycarbonyl on the terminal carbon atom of the (C_2 - C_6) alkynyl moiety,
or a salt thereof,
which comprises subjecting a compound of the formula:



wherein
R^2, R^3 and X are each as defined in claim 10, and
R'_c is (C_2 - C_6) alkynyloxy (C_1 - C_6) alkyl, in which the triple bond always exists on the terminal carbon atom of the (C_2 - C_6) alkynyl moiety,
or a salt thereof,
to acylation reaction.

14. A pharmaceutical composition which comprises, as an active ingredient, a compound of claim 1 or a pharmaceutically acceptable salt thereof in admixture with pharmaceutically acceptable carriers.

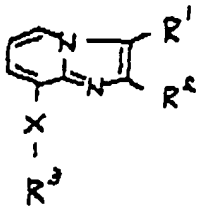
15. A compound of claim 1 or pharmaceutically acceptable salts thereof for use as a medicament.

16. A compound of claim 1 or pharmaceutically acceptable salts thereof for use in treating ulcer.

17. A compound of claim 1 or pharmaceutically acceptable salts thereof for the manufacture of a medicament for treating ulcer.

Revendications

1. Composés imidazohétérocycliques répondant à la formule :



dans laquelle

R^1 est un groupe alcényle en C_2 à C_6, alcynyle en C_2 à C_6 , alcadiényle en C_3 à C_6, (alcényloxy en C_2 à C_6)(alkyle en C_1 à C_6), (alcynyloxy en C_2 à C_6)(alkyle en C_1 à C_6), carboxy-(alcynyloxy en C_2 à C_6) (alkyle en C_1 à C_6) ou
(alcoxy en C_1 à C_6)carbonyl(alcynyloxy en C_2 à C_6)(alkyle en C_1 à C_6),

R^2 est un atome d'hydrogène, un groupe alyle en C_1 à C_6 ou aryle choisi parmi les groupes phényle, tolyle, xylyle, 1-naphtyle, 2-naphtyle, 1-anthryle et 2-anthryle,

R^3 est un groupe ar(alkyle en C_1 à C_6) qui a un ou plusieurs substituants appropriés choisis parmi un groupe alkyle en C_1 à C_6 et un atome d'halogène,
un groupe ar(alcényle en C_2 à C_6), cyclo(alkyle en C_5 à C_6) condensé sur le benzène, alkyle en C_1 à C_6 ayant un cyclo(alkyle en C_3 à C_6) ou alkyle en C_1 à C_6, et

X est O ou NH,

et un de leurs sels pharmaceutiquement acceptables.

2. Composé selon la revendication 1, dans lequel :

R^1 est un groupe alcényle en C_2 à C_6, alcynyle en C_2 à C_6, alcadiényle en C_3 à C_6, (alcényloxy en C_2 à C_6)(alkyle en C_1 à C_6),
(alcynyloxy en C_2 à C_6)(alkyle en C_1 à C_6), carboxy(alcynyloxy en C_2 à C_6)(alkyle en C_1 à C_6) ou
(alcoxy en C_1 à C_6)carbonyl (alcynyloxy en C_2 à C_6)(alkyle en C_1 à C_6) et

R^3 est un groupe ar(alkyle en C_1 à C_6) qui a un ou plusieurs substituants appropriés, choisis parmi un groupe alkyle en C_1 à C_6 et un atome d'halogène,
un groupe ar(alcényle en C_2 à C_6),
cyclo(alkyle en C_5 à C_6) condensé sur le benzène,
alkyle en C_1 à C_6 ayant un groupe cyclo(alkyle en C_3 à C_6) ou alkyle en C_1 à C_6.

3. Composé selon la revendication 2, dans lequel :

R^3 est un groupe ar(alkyle en C_1 à C_6) qui a un ou plusieurs substituants appropriés, choisis parmi un groupe alkyle en C_1 à C_6 et un atome d'halogène,

4. Composé selon la revendication 3, dans lequel :

R^3 est un groupe phényl(alkyle en C_1 à C_6) ou naphtyl(alkyle en C_1 à C_6), dont chacun a 1 à 3 substituants appropriés, choisis parmi un groupe alkyle en C_1 à C_6 et un atome d'halogène.

5. Composé selon la revendication 4, dans lequel :

R^1 est un groupe allyle, 2-propynyle, 1,2-propanediényle, allyloxyméthyle, 2-propynyloxyméthyle, 3-carboxy-2-propynyloxyméthyle ou 3-éthoxycarbonyl-2-propynyloxyméthyle,

R^2 est un atome d'hydrogène, un groupe méthyle ou phényle, et

R^3 est un groupe benzyle qui a 1 ou 2 substituants appropriés choisis parmi les groupes méthyle, éthyle, isopropyle, fluoro, chloro et bromo.

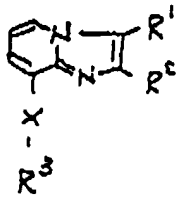
6. Composé selon la revendication 5, qui est choisi parmi :
la 8-(2-méthylbenzyloxy)-3-(2-propynyl)-2-méthylimidazo[1,2-a]-pyridine,
la 8-(2-éthylbenzyloxy)-3-(2-propynyl)-2-méthylimidazo[1,2-a]-pyridine,
la 8-(2-isopropylbenzyloxy)-3-(2-propynyl)-2-méthylimidazo[1,2-a]-pyridine,
la 8-(2-chlorobenzyloxy)-3-(2-propynyl)-2-méthylimidazo[1,2-a]-pyridine,
la 8-(3-chlorobenzyloxy)-3-(2-propynyl)-2-méthylimidazo[1,2-a]-pyridine,
la 8-(4-chlorobenzyloxy)-3-(2-propynyl)-2-méthylimidazo[1,2-a]-pyridine,
la 8-(2-bromobenzyloxy)-3-(2-propynyl)-2-méthylimidazo[1,2-a]-pyridine,
la 8-(2-fluorobenzyloxy)-3-(2-propynyl)-2-méthylimidazo[1,2-a]pyridine,
la 8-(2,6-diméthylbenzyloxy)-3-(2-propynyl)-2-méthylimidazo[1,2-a]-pyridine,
la 8-(2,6-dichlorobenzyloxy)-3-(2-propynyl)-2-méthylimidazo[1,2-a]-pyridine,
la 8-(2-méthylbenzylamino)-3-(2-propynyl)-2-méthylimidazo-[1,2-a]pyridine,
la 8-(2-chlorobenzylamino)-3-(2-propynyl)-2-méthylimidazo[1,2-a]pyridine,
la 8-(2-méthylbenzyloxy)-3-(1,2-propadiényl)-2-méthylimidazo[1,2-a]pyridine,
la 8-(2-méthylbenzyloxy)-3-(2-propynyloxyméthyl)-2-méthylimidazo[1,2-a]pyridine,
la 8-(2-chlorobenzyloxy)-3-(2-propynyloxyméthyl)-2-méthylimidazo[1,2-a]pyridine,
la 8-(3-chlorobenzyloxy)-3-(2-propynyloxyméthyl)-2-méthylimidazo[1,2-a]pyridine,
la 8-(4-chlorobenzyloxy)-3-(2-propynyloxyméthyl)-2-méthylimidazo[1,2-a]pyridine,
la 8-(2-bromobenzyloxy)-3-(2-propynyloxyméthyl)-2-méthylimidazo[1,2-a]pyridine,
la 8-(2,6-dichlorobenzyloxy)-3-(2-propynyloxyméthyl)-2-méthylimidazo[1,2-a]pyridine,
la 8-(3,4-dichlorobenzyloxy)-3-(2-propynyloxyméthyl)-2-méthylimidazo[1,2-a]pyridine,
la 8-(2,4-dichlorobenzyloxy)-3-(2-propynyloxyméthyl)-2-méthylimidazo[1,2-a]pyridine,
le chlorhydrate de 8-(2-méthylbenzylamino)-3-(2-propynyloxyméthyl)-2-méthylimidazo[1,2-a]pyridine,
le chlorhydrate de 8-(2-chlorobenzylamino)-3-(2-propynyloxyméthyl)-2-méthylimidazo[1,2-a]pyridine.

7. Composé selon la revendication 2, dans lequel :
R^1 est un groupe alcynyle en C_2 à C_6,
R^2 est un groupe alkyle en C_1 à C_6,
R^3 est un groupe phényl(alcényle en C_2 à C_6), 1,2,3,4-tétrahydronaphtyle, alkyle en C_1 à C_6 ayant un groupe cyclo(alkyle en C_3 à C_6) ou (alkyle en C_1 à C_6), et
X est O,

8. Composé selon la revendication 7 dans lequel :
R^1 est un groupe 2-propynyle,
R^2 est un groupe méthyle, et
R^3 est un groupe cinammyle, 1,2,3,4-tétrahydro-1-naphtyle, cyclohexylméthyle ou éthyle.

9. Composé selon la revendication 8, qui est choisi parmi :
la 8-(cinnamyloxy)-2-(2-propynyl)-2-méthylimidazo[1,2-a]-pyridine,
la 8-(1,2,3,4-tétrahydro-1-naphtyloxy)-3-(2-propynyl)-2-méthylimidazo[1,2-a]pyridine,
la 8-cyclohexylméthoxy-3-(2-propynyl)-2-méthylimidazo[1,2-a]pyridine,
et
la 8-éthoxy-3-(2-propynyl)-2-méthylimidazo[1,2-a]pyridine.

10. Procédé de préparation de composés imidazohétérocycliques répondant à la formule :



dans laquelle
R^1 est un groupe alcényle en C_2 à C_6,
alcynyle en C_2 à C_6,

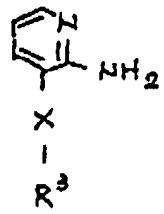
alcadiényle en C_3 à C_6,
(alcényloxy en C_2 à C_6)(alkyle en C_1 à C_6),
(alcynyloxy en C_2 à C_6)(alkyle en C_1 à C_6),
carboxy(alcynyloxy en C_2 à C_6) (alkyle en C_1 à C_6) ou
(alcoxy en C_1 à C_6)carboxy (alcynyloxy en C_2 à C_6)(alkyle en C_1 à C_6),

R^2 est un atome d'hydrogène, un groupe alkyle en C_1 à C_6 ou aryle choisi parmi les groupes phényle, tolyle, xylyle, 1-naphtyle, 2-naphtyle, 1-anthryle et 2-anthryle,

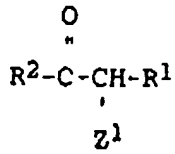
R^3 est un groupe ar(alkyle en C_1 à C_6) qui a un ou ou plusieurs substituants appropriés choisis parmi un groupe alkyle en C_1 à C_6 et un atome d'halogène,
un groupe ar(alcényle en C_2 à C_6), cyclo(alkyle en C_5 à C_6) condensé sur le benzène, alkyle en C_1 à C_6 ayant un groupe cyclo(alkyle en C_3 à C_6) ou (alkyle en C_1 à C_6), et

X est O ou NH.

ou un de ses sels, qui comprend le fait de faire réagir un composé répondant à la formule :

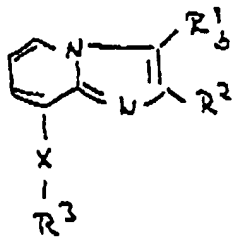


dans laquelle R^3 et X sont chacun tels que définis ci-dessus, ou un de ses sels, avec un composé répondant à la formule :

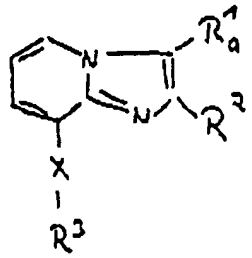


dans laquelle R^1 et R^2 sont chacun tels que définis ci-dessus, et Z^1 est un radical d'acide choisi parmi un atome d'halogène et un groupe acyloxy, ou un de ses sels.

11. Procédé de préparation de composés imidazohétérocycliques répondant à la formule :

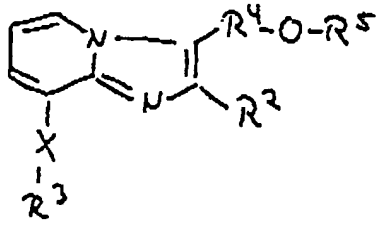


dans laquelle R^2, R^3 et X sont chacun tels que définis dans la revendication 10, et R_b^1 est un alcadiényle en C_3 à C_6 cumulé, ou un de ses sels, qui comprend le fait de soumettre un composé répondant à la formule :



dans laquelle R^2, R^3 et X sont chacun tels que définis dans la revendication 10, et R_a^1 est un groupe alcynyle en C_2 à C_6, ou un de ses sels, à une réaction d'isomérisation.

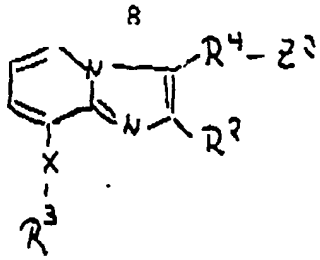
12. Procédé de préparation de composés imidazohétérocycliques répondant à la formule :



dans laquelle

R^2, R^3 et X	sont chacun tels que définis dans la revendication 10,
R^4 est	un groupe alkylène en C_2 à C_6, et
R^5 est	un groupe alcényle en C_2 à C_6, alcynyle en C_2 à C_6, carboxy(alcynyle en C_2 à C_6) ou (alcoxy en C_1 à C_6)carbonyl(alcynyle en C_2 à C_6),

ou un de ses sels, qui comprend le fait de faire réagir un composé répondant à la formule :



dans laquelle

R^2, R^3, R^4 et X	sont chacun tels que définis ci-dessus,
Z^2 est	un groupe partant,

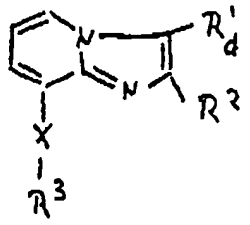
ou un de ses sels, avec un composé répondant à la formule :

R^5-OH

dans laquelle

R^5	est tel que défini ci-dessus ou un de ses sels.

13. Procédé de préparation de composés imidazohétérocycliques répondant à la formule :



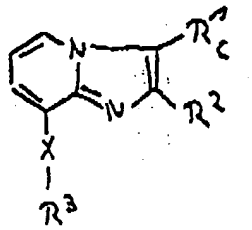
dans laquelle

R^2, R^3 et X sont chacun tels que définis dans la revendication 10,

R'_d est un groupe carboxy(alcynyloxy en C_2 à C_6)(alkyle en C_1 à C_6), dans lequel la triple liaison existe toujours sur l'atome de carbone terminal de la partie alcynyle en C_2 à C_6 et ce groupe (alcynyloxy en C_2 à C_6)(alkyle en C_1 à C_6) est substitué par un groupe carboxy sur l'atome de carbone terminal de la partie alcynyle en C_2 à C_6, ou un groupe (alcoxy en C_1 à C_6)carbonyl(alcynyloxy en C_2 à C_6)(alkyle en C_1 à C_6), dans lequel la triple liaison existe toujours sur l'atome de carbone terminal de la partie alcynyle en C_2 à C_6 et ce groupe (alcynyloxy en C_2 à C_6)(alkyle en C_1 à C_6) qui est substitué par un groupe (alcoxy en C_1 à C_6)carbonyle sur l'atome de carbone terminal de la partie alcynyle en C_2 à C_6,

ou un de ses sels,

qui comprend le fait de soumettre un composé répondant à la formule :



dans laquelle

R^2, R^3 et X sont chacun tels que définis dans la revendication 10, et

R'_c est un groupe (alcynyloxy en C_2 à C_6) (alkyle en C_1 à C_6), dans lequel la triple liaison existe toujours sur l'atome de carbone terminal de la partie alcynyle en C_2 à C_6 ,

ou un de ses sels,

à une réaction d'acylation

14. Composition pharmaceutique qui comprend comme ingrédient actif un composé selon la revendication 1, ou un de ses sels pharmaceutiquement acceptables en mélange avec des supports pharmaceutiquement acceptables.

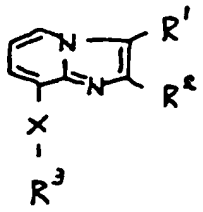
15. Composé selon la revendication 1 ou ses sels pharmaceutiquement acceptables pour l'utilisation comme médicament.

16. Composé selon la revendication 1, ou ses sels pharmaceutiquement acceptables pour l'utilisation dans le traitement des ulcères.

17. Composé selon la revendication 1, ou ses sels pharmaceutiquement acceptables pour la fabrication d'un médicament pour le traitement des ulcères.

Patentansprüche

1. Imidazo-heterocyclische Verbindungen der Formel:



worin

R^1 $(C_2\text{-}C_6)$Alkenyl, $(C_2\text{-}C_6)$Alkinyl,
$(C_3\text{-}C_6)$Alkadienyl,
$(C_2\text{-}C_6)$Alkenyloxy$(C_1\text{-}C_6)$alkyl,
$(C_2\text{-}C_6)$Alkinyloxy$(C_1\text{-}C_6)$alkyl,
Carboxy$(C_2\text{-}C_6)$alkinyloxy$(C_1\text{-}C_6)$alkyl oder
$(C_1\text{-}C_6)$alkoxycarbonyl$(C_2\text{-}C_6)$alkinyloxy$(C_1\text{-}C_6)$alkyl ist,

R^2 Wasserstoff, $(C_1\text{-}C_6)$Alkyl oder Aryl, ausgewählt aus der Gruppe, die aus Phenyl, Tolyl, Xylyl, 1-Naphthyl, 2-Naphthyl, 1-Anthryl und 2-Anthryl besteht, ist,

R^3 Ar$(C_1\text{-}C_6)$alkyl, das einen oder mehrere geeignete Substituenten hat, die aus einer Gruppe ausgewählt sind, die aus $(C_1\text{-}C_6)$Alkyl und Halogen besteht,
Ar$(C_2\text{-}C_6)$alkenyl, benzolkondensiertes Cyclo$(C_5\text{-}C_6)$alkyl,
$(C_1\text{-}C_6)$Alkyl mit Cyclo$(C_3\text{-}C_6)$alkyl oder$(C_1\text{-}C_6)$Alkyl ist, und

X O oder NH ist,

und ein pharmazeutisch unbedenkliches Salz hiervon.

2. Verbindung von Anspruch 1, worin

R^1 $(C_2\text{-}C_6)$Alkenyl, $(C_2\text{-}C_6)$Alkinyl, $(C_3\text{-}C_6)$Alkadienyl,
$(C_2\text{-}C_6)$Alkenyloxy$(C_1\text{-}C_6)$alkyl,
$(C_2\text{-}C_6)$Alkinyloxy$(C_1\text{-}C_6)$alkyl,
Carboxy$(C_2\text{-}C_6)$alkinyloxy$(C_1\text{-}C_6)$alkyl oder
$(C_1\text{-}C_6)$alkoxycarbonyl$(C_2\text{-}C_6)$alkinyloxy$(C_1\text{-}C_6)$alkyl ist und

R^3 Ar$(C_1\text{-}C_6)$alkyl, das einen oder mehrere geeignete Substituenten hat, die aus der Gruppe ausgewählt sind, die aus $(C_1\text{-}C_6)$Alkyl und Halogen besteht,
Ar$(C_2\text{-}C_6)$alkenyl, benzolkondensiertes Cyclo$(C_5\text{-}C_6)$alkyl,
$(C_1\text{-}C_6)$Alkyl mit Cyclo$(C_3\text{-}C_6)$alkyl oder $(C_1\text{-}C_6)$alkyl ist.

3. Verbindung von Anspruch 2, worin

R^3 Ar$(C_1\text{-}C_6)$alkyl ist, das einen oder mehrere geeignete Substituenten hat, die aus der Gruppe ausgewählt sind, die aus $(C_1\text{-}C_6)$Alkyl und Halogen besteht.

4. Verbindung von Anspruch 3, worin

R^3 Phenyl$(C_1\text{-}C_6)$alkyl oder Naphthyl$(C_1\text{-}C_6)$alkyl ist, welches jedes 1 bis 3 geeignete Substituenten hat, die aus der Gruppe ausgewählt sind, die aus $(C_1\text{-}C_6)$Alkyl und Halogen besteht.

5. Verbindung von Anspruch 4, worin

R^1 Allyl, 2-Propinyl, 1,2-Propadienyl, Allyloxymethyl, 2-Propinyloxymethyl, 3-Carboxy-2-propinyloxymethyl oder 3-Ethoxycarbonyl-2-propinyloxymethyl ist,

R^2 Wasserstoff, Methyl oder Phenyl ist, und

R^3 Benzyl ist, welches ein oder zwei geeignete Substituenten hat, die aus der Gruppe ausgewählt sind, die aus Methyl, Ethyl, Isopropyl, Fluor, Chlor und Brom besteht.

6. Verbindung von Anspruch 5, die aus der Gruppe ausgewählt ist, die aus:

8-(2-Methylbenzyloxy)-3-(2-propinyl)-2-methylimidazo[1,2-a]-pyridin,
8-(2-Ethylbenzyloxy)-3-(2-propinyl)-2-methylimidazo[1,2-a]-pyridin,
8-(2-Isopropylbenzyloxy)-3-(2-propinyl)-2-methylimidazo-[1,2-a]-pyridin,
8-(2-Chlorbenzyloxy)-3-(2-propinyl)-2-methylimidazo[1,2-a]-pyridin,
8-(3-Chlorbenzyloxy)-3-(2-propinyl)-2-methylimidazo[1,2-a]-pyridin,

8-(4-Chlorbenzyloxy)-3-(2-propinyl)-2-methylimidazo[1,2-a]-pyridin,
8-(2-Brombenzyloxy)-3-(2-propinyl)-2-methylimidazo[1,2-a]-pyridin,
8-(2-Fluorbenzyloxy)-3-(2-propinyl)-2-methylimidazo-[1,2-a]pyridin,
8-(2,6-Dimethylbenzyloxy)-3-(2-propinyl)-2-methylimidazo[1,2-a]pyridin,
8-(2,6-Dichlorbenzyloxy)-3-(2-propinyl)-2-methylimidazo[1,2-a]pyridin,
8-(2-Methylbenzylamino)-3-(2-propinyl)-2-methylimidazo[1,2-a]pyridin,
8-(2-Chlorbenzylamino)-3-(2-propinyl)-2-methylimidazo[1,2-a]pyridin,
8-(2-Methylbenzyloxy)-3-(1,2-propadienyl)-2-methylimidazo[1,2-a] pyridin,
8-(2-Methylbenzyloxy)-3-(2-propinyloxymethyl)-2-methylimidazo[1,2-a]pyridin,
8-(2-Chlorbenzyloxy)-3-(2-propinyloxymethyl)-2-methylimidazo[1,2-a]pyridin,
8-(3-Chlorbenzyloxy)-3-(2-propinyloxymethyl)-2-methylimidazo[1,2-a]pyridin,
8-(4-Chlorbenzyloxy)-3-(2-propinyloxymethyl)-2-methylimidazo[1,2-a]pyridin,
8-(2-Brombenzyloxy)-3-(2-propinyloxymethyl)-2-methylimidazo[1,2-a]pyridin,
8-(2,6-Dichlorbenzyloxy)-3-(2-propinyloxymethyl)-2-methylimidazo[1,2-a]pyridin,
8-(3,4-Dichlorbenzyloxy)-3-(2-propinyloxymethyl)-2-methylimidazo[1,2-a]pyridin,
8-(2,4-Dichlorbenzyloxy)-3-(2-propinyloxymethyl)-2-methylimidazo[1,2-a]pyridin,
8-(2-Methylbenzylamino)-3-(2-propinyloxymethyl)-2-methylimidazo[1,2-a]pyridinhydrochlorid,
8-(2-Chlorbenzylamino)-3-(2-propinyloxymethyl)-2-methylimidazo[1,2-a]pyridinhydrochlorid

besteht.

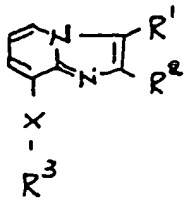
7. Verbindung von Anspruch 2, worin
- R^1 $(C_2\text{-}C_6)$Alkinyl ist,
- R^2 $(C_1\text{-}C_6)$Alkyl ist,
- R^3 Phenyl$(C_2\text{-}C_6)$alkenyl, 1,2,3,4-Tetrahydronaphthyl, $(C_1\text{-}C_6)$Alkyl mit Cyclo$(C_3\text{-}C_6)$alkyl oder $(C_1\text{-}C_6)$Alkyl ist, und
- X O ist.

8. Verbindung von Anspruch 7, worin
- R^1 2-Propinyl ist,
- R^2 Methyl ist und
- R^3 Cinnamyl, 1,2,3,4-Tetrahydro-1-naphthyl, Cyclohexylmethyl oder Ethyl ist.

9. Verbindung von Anspruch 8, welche aus der Gruppe ausgewählt ist, die besteht aus:

8-(Cinnamyloxy)-3-(2-propinyl)-2-methylimidazo[1,2-a]pyridin,
8-(1,2,3,4-Tetrahydro-1-naphthyloxy)-3-(2-propinyl)-2-methylimidazo[1,2-a]pyridin,
8-Cyclohexylmethoxy-3-(2-propinyl)-2-methylimidazo[1,2-a]pyridin, und
8-Ethoxy-3-(2-propinyl)-2-methylimidazo[1,2-a]pyridin.

10. Verfahren zur Herstellung von Imidazo-heterocyclischen Verbindungen der Formel:



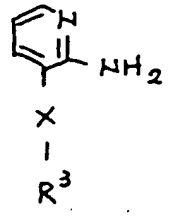
worin
- R^1 $(C_2\text{-}C_6)$Alkenyl, $(C_2\text{-}C_6)$Alkinyl,
  $(C_3\text{-}C_6)$Alkadienyl,
  $(C_2\text{-}C_6)$Alkenyloxy$(C_1\text{-}C_6)$alkyl,
  $(C_2\text{-}C_6)$Alkinyloxy$(C_1\text{-}C_6)$alkyl,
  Carboxy$(C_2\text{-}C_6)$alkinyloxy$(C_1\text{-}C_6)$alkyl oder
  $(C_1\text{-}C_6)$alkoxycarbonyl$(C_2\text{-}C_6)$alkinyloxy$(C_1\text{-}C_6)$alkyl ist,
- R^2 Wasserstoff, $(C_1\text{-}C_6)$Alkyl oder Aryl, ausgewählt aus der Gruppe, die aus Phenyl, Tolyl, Xylyl,

1-Naphthyl, 2-Naphthyl, 1-Anthryl und 2-Anthryl besteht, ist,

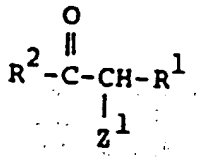
R^3 $Ar(C_1\text{-}C_6)alkyl$, das eine oder mehrere geeignete Substituenten hat, die aus einer Gruppe ausgewählt sind, die aus $(C_1\text{-}C_6)Alkyl$ und Halogen besteht, $Ar(C_2\text{-}C_6)alkenyl$, benzolkondensiertes $Cyclo(C_5\text{-}C_6)alkyl$, $(C_1\text{-}C_6)Alkyl$ mit $Cyclo(C_3\text{-}C_6)alkyl$ oder $(C_1\text{-}C_6)Alkyl$ ist, und

X O oder NH ist,

oder ein pharmazeutisch unbedenkliches Salz hiervon, welches Reaktion einer Verbindung der Formel:

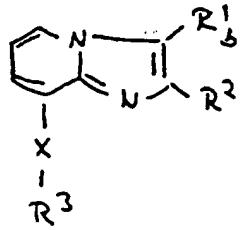


worin R^3 und X jeweils wie oben definiert sind, oder eines Salzes hiervon, mit einer Verbindung der Formel:

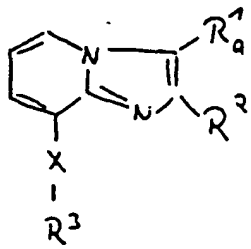


umfaßt, worin R^1 und R^2 jeweils wie oben definiert sind, und Z^1 ein saurer Rest ist; der aus der Gruppe ausgewählt wurde, die aus Halogen und Acyloxy besteht, oder ein Salz hiervon.

11. Verfahren zur Herstellung von Imidazo-heterocyclischen Verbindungen der Formel:

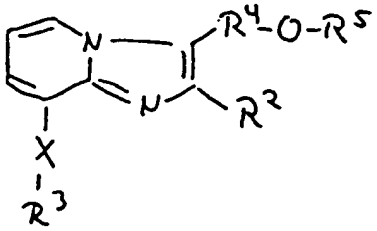


worin R^2, R^3 und X jeweils wie in Anspruch 10 definiert sind, und R_b^1 kumuliertes $(C_3\text{-}C_6)Alkadienyl$ ist, oder ein Salz hiervon, welches Unterwerfung einer Verbindung der Formel:



worin R^2, R^3 und X jeweils wie in Anspruch 10 definiert sind, und R_a^1 $(C_2\text{-}C_6)Alkinyl$ ist, oder ein Salz hiervon, der Isomerisierungsreaktion umfaßt.

12. Verfahren zur Herstellung von Imidazo-heterocyclischen Verbindungen der Formel



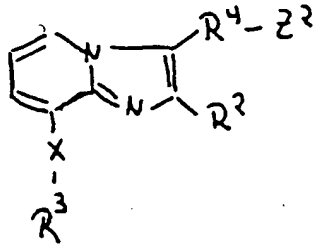
worin

R^2, R^3 und X jeweils wie in Anspruch 10 definiert sind,

R^4 $(C_2\text{-}C_6)$Alkylen ist, und

R^5 $(C_2\text{-}C_6)$Alkenyl, $(C_2\text{-}C_6)$Alkinyl, Carboxy$(C_2\text{-}C_6)$Alkinyl oder $(C_1\text{-}C_6)$Alkoxycarbonyl-$(C_2\text{-}C_6)$Alkinyl, oder ein Salz davon ist, welches umfaßt:

Reaktion einer Verbindung mit der Formel:



worin

R^2, R^3, R^4 und X jeweils wie oben definiert sind,

Z^2 eine Abgangsgruppe ist,

oder ein Salz hiervon, mit einer Verbindung der Formel:

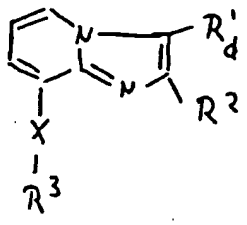
R^5 -OH

worin

R^5 wie oben definiert ist,

oder ein Salz hiervon.

13. Verfahren zur Herstellung von Imidazo-heterocyclischen Verbindungen der Formel:



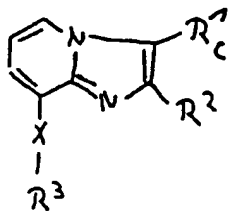
worin

R^2, R^3 und X jeweils wie in Anspruch 10 definiert sind,

R'_d Carboxy$(C_2\text{-}C_6)$alkinyloxy$(C_1\text{-}C_6)$alkyl ist, in welcher die Dreifachbindung immer am terminalen Kohlenstoffatom des $(C_2\text{-}C_6)$Alkinylteils besteht und diesem $(C_2\text{-}C_6)$-Alkinyloxy$(C_1\text{-}C_6)$alkyl mit Carboxy am terminalen Kohlenstoffatom der $(C_2\text{-}C_6)$-Alkinylanteils substituiert ist,

oder $(C_1\text{-}C_6)$Alkoxycarbonyl $(C_2\text{-}C_6)$alkinyloxy$(C_1\text{-}C_6)$alkyl, in welcher die Dreifachbindung immer an dem terminalen Kohlenstoffatom des $(C_2\text{-}C_6)$Alkinylanteils besteht und dieses $(C_2\text{-}C_6)$Alkinyloxy$(C_1\text{-}C_6)$alkyl mit $(C_1\text{-}C_6)$Alkoxycarbonyl an dem terminalen Kohlenstoffatom des $(C_2\text{-}C_6)$Alkinylanteils substituiert ist,

oder ein Salz davon,
welches umfaßt:
Unterwerfung einer Verbindung der Formel:



worin

R^2, R^3 und X jeweils wie in Anspruch 10 definiert sind, und

R'_c $(C_2\text{-}C_6)$Alkinyloxy$(C_1\text{-}C_6)$alkyl ist, in welcher die Dreifachbindung immer an dem terminalen Kohlenstoff des $(C_2\text{-}C_6)$Alkinylanteils besteht,

oder ein Salz hiervon,
der Acylierungsreaktion.

14. Pharmazeutische Zusammensetzung, die als einen aktiven Bestandteil eine Verbindung von Anspruch 1 oder ein pharmazeutisch unbedenkliches Salz hiervon in Beimischung mit einem pharmazeutisch unbedenklichen Träger umfaßt.

15. Verbindung von Anspruch 1 oder ein pharmazeutisches Salz hiervon zur Verwendung als Medikament.

16. Verbindung von Anspruch 1 oder pharmazeutisch unbedenkliche Salze hiervon zur Verwendung in der Behandlung von Geschwüren.

17. Verbindung von Anspruch 1 oder pharmazeutisch unbedenkliche Salze hiervon zur Herstellung eines Medikaments zur Behandlung von Geschwüren.